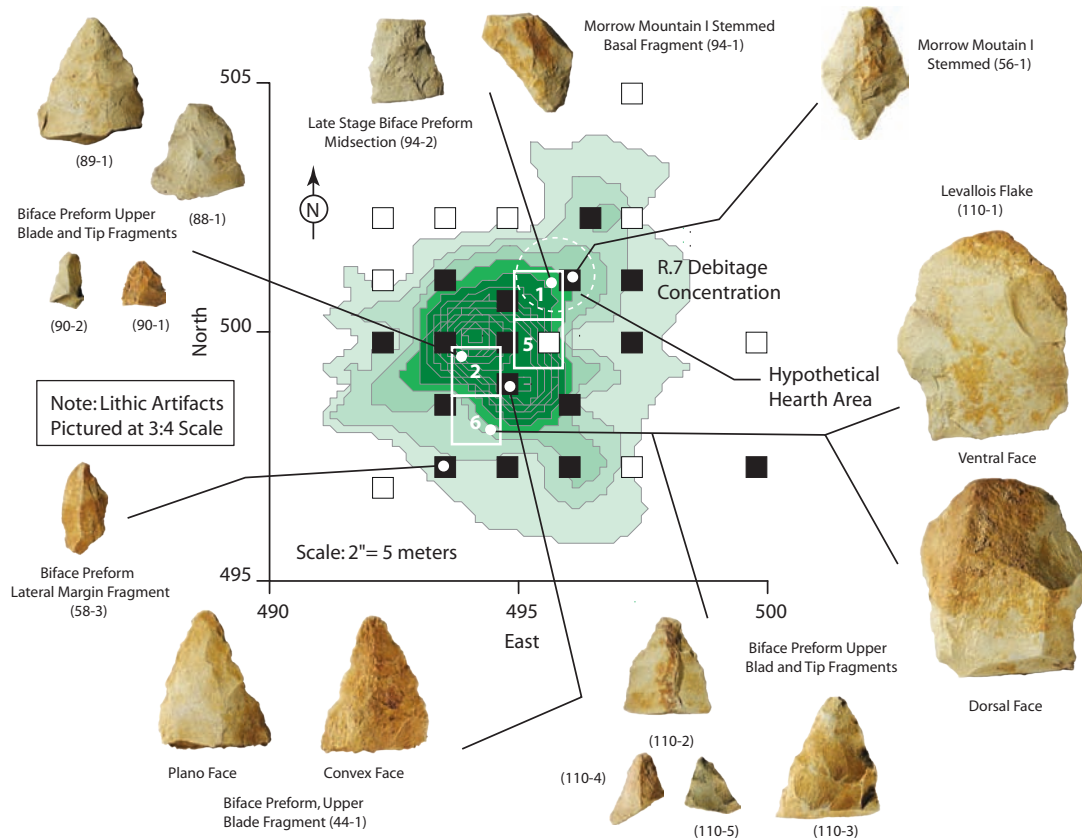


# PHASE II ARCHAEOLOGICAL TESTING AND EVALUATIONS OF NINE PREHISTORIC SITES, FORT BRAGG, NC (C5890020435-D5095020469)

## Volume 1: Nine Prehistoric Sites



**Palmetto Research Institute**  
1419 Salem Church Rd  
Irmo, SC 29063

May 31, 2005

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. <b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>					
1. REPORT DATE (DD-MM-YYYY) 31-05-2005		2. REPORT TYPE Final		3. DATES COVERED (From - To) October 2002 - October 2007	
4. TITLE AND SUBTITLE  Phase II Archaeological Testing and Evaluations of Thirteen Sites, Fort Bragg, NC. Volume 1: Nine Prehistoric Sites.				5a. CONTRACT NUMBER C5890020435-D5095020469	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)  John S. Cable and Charles E. Cantley, with contributions from David E. Port				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  Palmetto Research Institute 1419 Salem Church Rd Irmo, SC 29063				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)  National Park Service Southeast Archaeological Center 2035 East Paul Dirac Drive Johnson Building, Suite 120 Tallahassee, Florida 32310  Department of the Army XVIII ABN Corps and Fort Bragg Fort Bragg, North Carolina 38310				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT  Approved for Public Release					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT  The Public Works Business Center, under the administration of the National Park Service, sponsored this project to conduct archaeological testing and evaluation-related cultural resource management tasks at Fort Bragg, North Carolina. Palmetto Research Institute performed the Phase II testing and evaluation of 13 archaeological sites under a Contract (C5890020435) with the National Park Service that was structured to extend up to a period of five years and to be administered in separate delivery orders. This project (D5095020469) is the first of a series of delivery orders (DO#1) to be conducted under the agreement. The Phase II investigations were undertaken in compliance with the National Historic Preservation Act (Public Law 89-665, as amended by Public Law 96-515) Guidelines for Federal Agency Responsibilities, under Sections 106 and 110 of the National Historic Preservation Act, Army Regulation AR 200-4, and 36 CFR 800 (Protection of Historic and Cultural Properties). Volume 1 describes the results of the prehistoric sites investigation, while Volume 2 reports on the historic sites investigations.  All nine of the prehistoric sites represent seasonal re-occupations by a wide range of cultural groups extending over a period of at least 10,000 years. Each contains a degree of integrity and decisions concerning eligibility were based on redundancy, component representation, and the relative comprehensiveness of the data collected during Phase II investigations. The three Hoke County sites (31HK1094, 31HK1126, and 31HK1142), by virtue of their low re-occupation intensity and small sizes, were shown to have relatively undisturbed Archaic camps comprised of either nuclear families or special purpose hunting or gathering task groups. Disproportionate effort was extended on these sites to first demonstrate that they contained information of importance to settlement pattern reconstruction and second to gather sufficient data to obviate the need to preserve them in the NRHP system. All three yielded important data on Archaic camp structure, but they were sampled at such a high intensity that it was argued that further work on these sites would not substantially advance our understanding of Archaic systems in the region further. Consequently, none were recommended eligible for the NRHP. Many other sites of similar structure still exist in the region and can be drawn on to supplement the sample recovered from the small Hoke County sites. A similar approach was applied to 31CD810, another small, lightly reoccupied site with both Archaic and Woodland components. The remaining five prehistoric sites (31CD898, 31CD913, 31CD919, 31CD924, and 31CD927) are larger, more heavily reoccupied, and are situated in a tight cluster in the upper watershed McPherson Creek. Here, redundancy and component preservation were used to evaluate the sites. 31CD898 and 31CD913 were recommended eligible for the NRHP for their intensive Early, Middle and Late Woodland occupations, while 31CD924 was recommended eligible for its extensive and well-preserved Archaic occupation. Together, these three sites should provide a nearly complete view of the character of prehistoric occupation in the upper McPherson Creek drainage system. Sites 31CD919 and 31CD927 were recommended ineligible due to poor preservation and redundancy of occupation history.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT  UU	18. NUMBER OF PAGES  708 + Front Matter	19a. NAME OF RESPONSIBLE PERSON John S. Cable
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (include area code) (803) 732-6170

**PHASE II ARCHAEOLOGICAL TESTING AND  
EVALUATIONS OF THIRTEEN SITES,  
FORT BRAGG, NC  
(C5890020435-D5095020469)**

**Volume 1: Nine Prehistoric Sites**

Authors: John S. Cable and Charles E. Cantley  
Contributions: David E. Port

---

John S. Cable  
Principal Investigator

Submitted to  
National Park Service  
Southeast Archeological Center  
2035 East Paul Dirac Drive  
Johnson Building, Suite 120  
Tallahassee, Florida 32310

and

Department of the Army  
XVIII ABN Corps and Fort Bragg  
Attn: AFZA-PW-E (Mr. Jeff Irwin)  
Fort Bragg, North Carolina 28310

**Palmetto Research Institute**  
1419 Salem Church Rd  
Irmo, SC 29063

May 31, 2005

## Table of Contents: Volume 1

Table of Contents .....	i
List of Figures .....	vii
List of Tables .....	xi
Abstract .....	xiv
 <b>Chapter 1. Introduction</b> .....	 1
 <b>Chapter 2. Environment</b> .....	 9
INTRODUCTION .....	9
REGIONAL PHYSIOGRAPHY .....	9
GEOLOGY AND SOILS .....	11
REGIONAL CLIMATE .....	13
BIOGEOGRAPHY OF THE INTER-RIVERINE UPLANDS .....	13
PALEOENVIRONMENT .....	17
Paleoclimate .....	18
Paleovegetation .....	19
Paleofauna .....	23
Paleoshorelines .....	25
 <b>Chapter 3. Research Design</b> .....	 27
APPROACH TO RESEARCH .....	27
Concept of Occupation Clusters .....	28
Cluster Measures .....	38
Environmental Zone Typologies .....	40
Regional Models .....	40
Integration of Regional Models and Cultural Context .....	40
ANALYSIS SYSTEMS .....	47
FIELD METHODS .....	48
Use and Treatment of Previous Investigations and Data .....	49
Archival Investigations .....	49
Site Map .....	49
Site Boundaries .....	50
Shovel Tests .....	51
Test Units .....	51
Metal Detector Surveys .....	51
Photography .....	52
GPS Data .....	52
NRHP EVALUATIONS .....	52
CURATION .....	53
Treatment of Artifacts .....	53
Associated Records .....	53
NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT (NAGPRA) .....	53
 <b>Chapter 4. Prehistoric Culture History</b> .....	 55
PALEOINDIAN PERIOD .....	55
ARCHAIC PERIOD .....	57
WOODLAND PERIOD .....	64
MISSISSIPPIAN PERIOD .....	68
PROTOHISTORIC AND EARLY HISTORIC NATIVE AMERICANS .....	69

## *Table of Contents: Volume 1 (cont.)*

<b>Chapter 5. Lithic Analysis</b> .....	73
RAW MATERIAL CLASSES .....	73
Metavolcanic .....	75
Quartz .....	79
Minority Lithic Classes .....	80
DEBITAGE .....	81
Size Class and Condition.....	81
Percent Cortex .....	81
Formal Classes .....	82
CORES .....	83
Unmodified Cores .....	83
Directional Cores.....	84
Core Fragments .....	84
Flake Blanks .....	84
BIFACES .....	87
Biface Cores/Preforms .....	87
Biface Tools.....	89
PROJECTILE POINTS .....	89
Archaic Projectile Point Types .....	89
Woodland Projectile Point Types .....	94
Non-Diagnostic Tools and Fragments .....	98
UNIFACES .....	98
End Scrapers.....	98
Side Scrapers .....	100
Denticulates .....	101
RETOUCHED FLAKES .....	101
Perforators .....	101
Scallop Scrapers .....	101
Spoke Shaves.....	101
Serrated Knives .....	101
Hafted Knife .....	102
Hafted Flake Adz.....	102
UNMODIFIED FLAKE TOOLS .....	102
COBBLE TOOLS.....	102
Grinding Stones .....	102
Hammer Stones .....	105
GROUND STONE IMPLEMENTS.....	105
 <b>Chapter 6. Ceramic Analysis</b> .....	 107
ANALYTICAL METHODS.....	107
Ceramic Form.....	107
Surface Treatment Variables.....	108
Paste Variables.....	110
Sherd Wall Thickness .....	112
Sherd Size.....	112
Rim Variables .....	112
Vessel Identification .....	113
Culture Historic Identification.....	113

## *Table of Contents: Volume 1 (cont.)*

### **Chapter 6. Ceramic Analysis (cont.)**

SERIES DESCRIPTIONS.....	113
Thom's Creek Series .....	113
New River Series.....	115
Yadkin Series.....	118
Cape Fear Series.....	119
Hanover Series .....	119

### **Chapter 7. 31CD810 .....**

INTRODUCTION.....	127
PRIOR INVESTIGATIONS.....	127
STAGE I SHOVEL TEST INVESTIGATIONS.....	128
STAGE II SHOVEL TEST INVESTIGATIONS .....	134
TEST UNITS.....	134
ARTIFACT INVENTORY .....	137
OCCUPATION PATTERNS.....	137
Sample Block 1 .....	137
Sample Block 2 .....	149
Sample Block 3 .....	153
EVALUATION.....	157

### **Chapter 8. 31CD898 .....**

INTRODUCTION.....	159
PRIOR INVESTIGATIONS.....	159
SHOVEL TEST INVESTIGATIONS .....	160
TEST UNITS.....	163
ARTIFACT INVENTORY .....	166
OCCUPATION PATTERNS.....	170
Test Unit 1 .....	174
Test Unit 2 .....	179
Test Unit 3 .....	180
Test Unit 4 .....	181
Test Unit 5 .....	183
Test Unit 6 .....	184
Test Unit 7 .....	186
Test Unit 8 .....	186
EVALUATION.....	187

### **Chapter 9. 31CD913 .....**

INTRODUCTION.....	191
PRIOR INVESTIGATIONS.....	191
STAGE I SHOVEL TEST INVESTIGATIONS.....	193
STAGE II SHOVEL TEST INVESTIGATIONS .....	196
TEST UNITS.....	201
ARTIFACT INVENTORY .....	203
OCCUPATION PATTERNS.....	206
Sample Block 1 .....	207

## *Table of Contents: Volume 1 (cont.)*

<b>Chapter 9. 31CD913 (cont.)</b>	
OCCUPATION PATTERNS (cont.) .....	206
Sample Block 2 .....	222
Northern Extension of 31CD916.....	222
EVALUATION .....	227
 <b>Chapter 10. 31CD919</b> .....	231
INTRODUCTION .....	231
PRIOR INVESTIGATIONS .....	231
STAGE I SHOVEL TEST INVESTIGATIONS.....	234
STAGE II SHOVEL TEST INVESTIGATIONS .....	236
TEST UNITS .....	236
ARTIFACT INVENTORY .....	236
OCCUPATION PATTERNS .....	248
Sample Block 1 .....	248
Northeast Area.....	262
EVALUATION .....	265
 <b>Chapter 11. 31CD924</b> .....	267
INTRODUCTION .....	267
PRIOR INVESTIGATIONS .....	267
STAGE I INVESTIGATIONS.....	269
TEST UNITS .....	271
ARTIFACT INVENTORY .....	272
OCCUPATION PATTERNS.....	276
Test Unit 1 .....	282
Test Unit 2 .....	286
Test Unit 3 .....	287
Test Unit 4 .....	288
Test Unit 5 .....	289
Test Unit 6 .....	289
Test Unit 7 .....	291
EVALUATION .....	292
 <b>Chapter 12. 31CD927</b> .....	295
INTRODUCTION .....	295
PRIOR INVESTIGATIONS .....	295
STAGE I INVESTIGATIONS.....	297
STAGE II INVESTIGATIONS .....	300
TEST UNITS .....	303
ARTIFACT INVENTORY .....	303
OCCUPATION PATTERNS .....	307
Sample Block 1 .....	309
Sample Block 2 .....	309
Sample Block 3 .....	316
EVALUATION .....	317

## *Table of Contents: Volume 1 (cont.)*

<b>Chapter 13. 31HK1094</b>	321
INTRODUCTION	321
PRIOR INVESTIGATIONS	321
STAGE I INVESTIGATIONS	323
STAGE II INVESTIGATIONS	325
TEST UNITS	325
ARTIFACT INVENTORY	325
OCCUPATION PATTERNS	327
Sample Block 1	330
Sample Block 2	331
EVALUATION	335
 <b>Chapter 14. 31HK1126</b>	 339
INTRODUCTION	339
PRIOR INVESTIGATIONS	339
STAGE I INVESTIGATIONS	342
STAGE II INVESTIGATIONS	342
TEST UNITS	344
ARTIFACT INVENTORY	345
OCCUPATION PATTERNS	351
Sample Block 1	351
Sample Block 2	351
Sample Block 3	355
EVALUATION	356
 <b>Chapter 15. 31HK1142</b>	 363
INTRODUCTION	363
PRIOR INVESTIGATIONS	363
STAGE I SHOVEL TEST INVESTIGATIONS	366
STAGE II SHOVEL TEST INVESTIGATIONS	366
TEST UNITS	370
ARTIFACT INVENTORY	371
OCCUPATION PATTERNS	371
EVALUATION	376
 <b>Chapter 16. Prehistoric Synthesis</b>	 381
VERTICAL COHERENCE OF DEPOSITS	381
CULTURE HISTORIC SEQUENCE	387
OCCUPATION TYPES AND SETTLEMENT SYSTEMS	390
FINAL COMMENTS	399
 <b>References Cited</b>	 401
 <b>Appendix A: Differentially Corrected GPS Coordinates for All Sites</b>	 435
<b>Appendix B: Lithic Artifact Database</b>	439
<b>Appendix C: Metavolcanic Subtype Descriptions</b>	547



*Table of Contents: Volume 1 (cont.)*

<b>Appendix D: Metric Data for Cores.....</b>	<b>553</b>
<b>Appendix E: Metric Data for Bifaces.....</b>	<b>557</b>
<b>Appendix F: Metric Data for Projectile Points .....</b>	<b>561</b>
<b>Appendix G: Metric Data for Unifaces.....</b>	<b>565</b>
<b>Appendix H: Metric Data for Retouched Flakes.....</b>	<b>569</b>
<b>Appendix I: Metric Data for Utilized Flakes.....</b>	<b>573</b>
<b>Appendix J: Metric Data for Cobble Tools .....</b>	<b>577</b>
<b>Appendix K: Ceramic Database.....</b>	<b>581</b>
<b>Appendix L: Provenience Data .....</b>	<b>603</b>
<b>Appendix M: Faunal and Ethnobotanical Data.....</b>	<b>697</b>
<b>Appendix N: Historic Artifacts .....</b>	<b>701</b>
<b>Appendix O: Special Samples.....</b>	<b>705</b>

## *List of Figures*

1. Location Map, Fort Bragg, NC .....	2
2. Location of Cumberland County Prehistoric Sites (Overhills, NC 1957, PR1971, 7.5 Minute USGS ; Scale 1:48000)....	3
3. Location of Hoke County Prehistoric Sites (Niagra, NC, 1998, 7.5 Minute USGS ; Scale 1:48000).....	4
4. Location of Cumberland County Historic Sites in the Longstreet Study Area (Overhills, NC 1957, PR1971, 7.5 Minute USGS ; Scale 1:48000).....	6
5. Location of Hoke County Historic Sites, Silver Run Study Area (Niagra, NC, 1998, 7.5 Minute USGS ; Scale 1:48000) .....	7
6. Physiographic Regions Surrounding Fort Bragg, NC .....	10
7. Location of Pollen Sites Discussed in Text Relative to Modern Vegetation Associations .....	20
8. Historic Artifact Distributions and Components at Salt Pond Plantation, Francis Marion NF, SC.....	30
9. Prehistoric Occupation Clusters at Salt Pond Plantation, Francis Marion NF, SC .....	31
10. Structure of Two-household !Kung Residential Camp (from Yellen 1977) .....	33
11. Simulated Reoccupations of Tanagaba-like Settlements .....	34
12. Shovel Test Pattern, 38SU136/137, Poinsett Range, South Carolina .....	35
13. Vertical Density Distributions of Prehistoric Sherds and Lithics, 38SU136/137 .....	36-37
14. Dendrogram of Metavolcanic Subtype Classification .....	77
15. Directional and Unmodified Cores .....	85
16. Flake Blanks.....	86
17. Bifaces.....	88
18. Archaic Projectile Point Styles .....	90
19. Woodland Projectile Point Styles.....	95
20. Unifacces and Retouched Flakes .....	99
21. Unmodified Flake Tools.....	103
22. Cobble Tools .....	104
23. Ground Stone Ornament Fragment.....	105
24. Miscellaneous Clay Artifacts .....	109
25. North Carolina Coastal Plain Ceramic Sequences (from Herbert 2003) .....	114
26. Thom's Creek and New River Series Ceramics.....	117
27. Cape Fear Series Ceramics .....	121
28. Hanover Series Fabric Impressed, Rigid Warp.....	123
29. Hanover Series Fabric Impressed, Flexible Warp.....	124
30. Hanover Series Cord Marked, Check Stamped, and Plain .....	125
31. Phase I Map of 31CD810 (Benson 2000).....	128
32. Location Map, 31CD810 (Overhills, NC, 7.5' USGS Quad, 1957(PR 1971) .....	129
33. Site 31CD810, Looking South from Near Datum .....	130
34. Site Base Map, 31CD810.....	131
35. Site 31CD810, Stage I Shovel Tests .....	132
36. Stage I Artifact Density Distributions, 31CD810 .....	133
37. Stage II Shovel Test and Sample Block Locations, 31CD810.....	135
38. Test Unit Locations, 31CD810 .....	136
39. Wall Profiles, Test Units 1, 2, 6, and 7, 31CD810 .....	138
40. Test Unit 2, South Wall Profile, 31CD810 .....	139
41. Test Unit 6, West Wall Profile, 31CD810 .....	139
42. Test Units 3, 4, and 5, North Wall Profile, 31CD810.....	140
43. Photograph, Test Units 3, 4, and 5, North Wall Profile, 31CD810 .....	140
44. Sample Block I, 31CD810 .....	142
45. Sample Block I, Distribution of Ceramics and Fire-cracked Rock, 31CD810.....	143
46. Sample Block I, Debitage Distribution of Metavolcanic Subtypes, 31CD810.....	145
47. Sample Block I, Debitage Distribution of Quartz Subtypes, 31CD810 .....	146
48. Sample Block 2, 31CD810 .....	150
49. Sample Block 2, Artifact Distributions, 31CD810 .....	152
50. Sample Block 3, 31CD810 .....	155

## *List of Figures (cont.)*

51. Sample Block 3, Artifact Distributions, 31CD810 .....	155
52. Phase I Survey Map (Benson 2002), 31CD898 .....	160
53. Location Map, 31CD898 (Overhills, NC, 7.5' USGS Quad, 1957(PR 1971)) .....	161
54. Site Base Map, 31CD898.....	162
55. Location of Stage I Shovel Tests, 31CD898 .....	164
56. Location of Stage I and Stage II Shovel Tests, 31CD898.....	165
57. Location of Test Units, 31CD898 .....	167
58. Test Unit Wall Profiles, 31CD898.....	168
59. Photograph, Test Unit 5, West Wall Profile, 31CD898 .....	169
60. Photograph, Test Unit 6, South Wall Profile, 31CD898.....	169
61. Density Distributions of Ceramic Series, 31CD898.....	173
62. Density Distributions of Quartz Debitage, 31CD898 .....	175
63. Paired Clusters of Sherd Aggregates and Quartz Debitage Concentrations, 31CD898.....	176
64. Density Distributions of Metavolcanic Debitage, 31CD898 .....	178
65. Location Map, 31CD913 (Overhills, NC 7.5' USGS Quad 1957, PR1991).....	192
66. 31CD913, Looking North Along Firebreak Road.....	193
67. Phase I Survey Map (Benson 2002), 31CD913 .....	194
68. Base Map and Stage I Shovel Tests, 31CD913 and 31CD916 .....	195
69. Stage I Ceramic Density Distributions, 31CD913.....	197
70. Stage I Quartz Debitage Density Distributions, 31CD913 .....	198
71. Stage I Metavolcanic Debitage Density Distributions, 31CD913 .....	199
72. Stage II Shovel Tests, 31CD913 and 31CD916.....	200
73. Test Unit Locations, 31CD913 and 31CD916 .....	202
74. Test Unit Wall Profiles, 31CD913 and 31CD916 .....	204
75. Test Units 5 and 6, South Wall Profile, 31CD913.....	205
76. Test Unit 9, South Wall Profile, 31CD913 .....	205
77. Test Unit 10, South Wall Profile, 31CD916.....	206
78. Test Units 1 and 2, South Wall Profile, 31CD913.....	207
79. Ceramic Density Distributions, Sample Block 1, 31CD913.....	211
80. Quartz Debitage Density Distributions, Sample Block 1, 31CD913.....	212
81. Paired Quartz Debitage and Ceramic Concentrations, Sample Block 1, 31CD913 .....	213
82. Metavolcanic Debitage Distributions, Sample Block 1, 31CD913 .....	216
83. Comparison of Metavolcanic Debitage and Ceramic Concentrations, Sample Block 1, 31CD913.....	217
84. Sherd Aggregation, TU5/TU6 Trench, Looking South, 31CD913 .....	221
85. Artifact Distributions, Sample Block 2, 31CD913 .....	225
86. Location Map, 31CD919 (Overhills, NC 7.5' USGS Quad 1957, PR1991).....	232
87. Phase I Survey Map (Benson 2002), 31CD919 .....	233
88. View of 31CD919, Looking South along Central Dirt Road.....	234
89. Stage I Shovel Tests, 31CD919.....	235
90. Stage I Ceramic Density Distributions, 31CD919.....	237
91. Stage I Quartz Debitage Density Distributions, 31CD919 .....	238
92. Stage I Metavolcanic Debitage Density Distributions, 31CD919 .....	239
93. Stage II Shovel Tests and Sample Block Locations, 31CD919 .....	240
94. Test Unit Locations, 31CD919 .....	242
95. Test Unit Wall Profiles, 31CD919.....	243
96. Test Units 1 and 2, South Profile, 31CD919.....	244
97. Test Unit 4, South Profile, 31CD919 .....	244
98. Test Unit 6, East Profile, 31CD919.....	245
99. Test Unit 3, South Profile, 31CD919 .....	245
100. Ceramic Density Distributions, Sample Block 1, 31CD919.....	251
101. Metavolcanic Debitage Density Distributions, Sample Block 1, 31CD919.....	252
102. Quartz Debitage Density Distributions, Sample Block 1, 31CD919.....	253

## *List of Figures (cont.)*

103. Location Map, 31CD924 (Overhills, NC 7.5' USGS Quad 1957, PR1991).....	268
104. Phase I Survey Map (Benson 2002), 31CD924.....	269
105. Stage I Shovel Test and Test Unit Locations, 31CD924.....	270
106. Test Unit Wall Profiles, 31CD924.....	273
107. Test Unit 2, West Profile, 31CD924.....	274
108. Test Unit 3, East Profile, 31CD924.....	274
109. Test Unit 1, South Profile, 31CD924.....	275
110. Test Unit 6, East Profile, 31CD924.....	275
111. Feature 1 Plan, Test Unit 1, 31CD924.....	276
112. Stage I Total Ceramic Density Distributions, 31CD924.....	280
113. Stage I Ceramic Series Density Distributions, 31CD924.....	281
114. Stage I Quartz Debitage Density Distributions, 31CD924.....	283
115. Stage I Metavolcanic Debitage Density Distributions, 31CD924.....	284
116. Location Map, 31CD927 (Overhills, NC 7.5' USGS Quad 1957, PR1991).....	296
117. View of 31CD927, Looking Northeast to McPherson Creek.....	297
118. Phase I Survey Map (Benson 2002), 31CD927.....	298
119. Stage I Shovel Test Locations, 31CD927.....	299
120. Stage I Quartz Debitage and Ceramic Density Distributions, 31CD927.....	301
121. Stage I Metavolcanic Debitage Density Distributions, 31CD927.....	302
122. Locations of Stage II Shovel Tests, Sample Blocks, and Test Units, 31CD927.....	304
123. Test Unit Wall Profiles, 31CD927.....	305
124. Test Unit 2, North Profile, 31CD927.....	306
125. Test Unit 4, West Profile, 31CD927.....	306
126. Artifact Density Distribution, Sample Block 1, 31CD927.....	311
127. Ceramic and Quartz Debitage Density Distributions, Sample Block 2, 31CD927.....	314
128. Metavolcanic Debitage Density Distributions, Sample Block 2, 31CD927.....	315
129. Location Map, 31HK1094 (Niagra, NC 7.5' USGS Quad 1998).....	322
130. Phase I Survey Map (Benson 2000), 31HK1094.....	323
131. Stage I Shovel Test Locations, 31HK1094.....	324
132. Locations of Stage II Shovel Tests, Sample Blocks, and Test Units, 31HK1094.....	326
133. Test Unit Wall Profiles, 31HK1094.....	328
134. Test Unit 5, West Profile, 31HK1094.....	329
135. Test Unit 4, East Profile, 31HK1094.....	329
136. Stage I Artifact Density Contours, 31HK1094.....	331
137. Artifact Density Contours, 5 m Interval Data, 31HK1094.....	332
138. Artifact Density Distributions, Sample Block 1, 31HK1094.....	333
139. Artifact Density Distributions, Sample Block 2, 31HK1094.....	334
140. Location Map, 31HK1126 (Niagra, NC 7.5' USGS Quad 1998).....	340
141. 31HK1126, From Dirt Road Looking Southeast.....	341
142. Phase I Survey Map (Benson 2000), 31HK1126.....	341
143. Stage I Shovel Test Locations, 31HK1126.....	343
144. Stage I Artifact Density Distributions, 31HK1126.....	344
145. Artifact Density Distributions, 10 m and 5 m Interval Shovel Tests, 31HK1126.....	345
146. Stage II Shovel Tests, Sampling Block, and Test Unit Locations, 31HK1126.....	346
147. Test Unit Profiles, 31HK1126.....	347
148. Test Unit 3, East Wall, 31HK1126.....	348
149. Test Unit 4, East Wall, 31HK1126.....	349
150. Sample Block 1, 31HK1126.....	352
151. Sample Block 2, 31HK1126.....	355
152. Sample Block 3, 31HK1126.....	357
153. Morrow Mountain I Residential Camp, 31HK1126.....	359

## *List of Figures (cont.)*

154. Location Map, 31HK1142 (Niagra, NC 7.5' USGS Quad 1998) .....	364
155. Phase I Survey Map (Benson 2000), 31HK1142 .....	365
156. 31HK1142, Excavations within Original Site Boundary .....	365
157. Stage I Shovel Test Locations, 31HK1142 .....	367
158. Artifact Density Distributions, 10 m and 5 m Interval Shovel Tests, 31HK1142 .....	368
159. Stage II Shovel Test, Sample Block, and Test Unit Locations, 31HK1142 .....	369
160. Test Unit Profiles, 31HK1142 .....	372
161. Test Unit 1, South Wall, 31HK1142 .....	373
162. Test Unit 2, South Wall, 31HK1142 .....	373
163. Test Unit 5, South Wall, 31HK1142 .....	374
164. Sample Block 1, 31HK1142 .....	377
165. Correlation of Major Sandhills Ceramic Series (Herbert 2003) and Woodland Projectile Point Types .....	388
166. Representation of Walukaritji Unmarried Men's Camp (Hayden 1979) .....	392
167. Example of Logistical Camp Excavated in Sumter County, SC (Cable and Cantley 1998) .....	393
168. A Bushmen Multi-Household Camp (Yellen 1977) .....	395
169. Efe Multi-Household Seasonal Settlement (Fischer and Strickland 1991) .....	396

## *List of Tables*

1. Summary of Cubic Meter Allocations by Site, Delivery Order 1.....	50
2. Lithic Raw Material Distributions by Site.....	76
3. Metavolcanic Raw Material Subtype Correlation .....	78
4. Quartz Subtype Distributions .....	79
5. Percent of Major Raw Material Types Containing Cortex, All Debitage .....	82
6. Quartz Sand Grain Size Distributions.....	111
7. Summary of Ceramic Series and Items by Site .....	115
8. New River Series Distribution by Site.....	116
9. Cape Fear Series Distribution by Site.....	120
10. Hanover Series Distribution by Site .....	122
11. Comparison of Positive/Negative Shovel Test Results, 31CD810 .....	134
12. Test Unit Data, 31CD810.....	137
13. Artifact Inventory, 31CD810 .....	141
14. Vertical Distribution of Ceramics, Sample Block I, 31CD810.....	144
15. Vertical Distribution of Lithics, Sample Block I, 31CD810.....	144
16. Vertical Distribution of Artifacts, Test Unit 6, 31CD810 .....	147
17. Vertical Distribution of Artifacts, Test Unit 7, 31CD810 .....	148
18. Vertical Distribution of Artifacts, Sample Block 2, 31CD810.....	153
19. Vertical Distribution of Artifacts, Test Units 3, 4, and 5, 31CD810.....	154
20. Vertical Distribution of Artifacts, Sample Block 3, 31CD810.....	156
21. Vertical Distribution of Artifacts, Test Unit 1, 31CD810 .....	157
22. Vertical Distribution of Artifacts, Test Unit 2, 31CD810 .....	157
23. Comparison of Positive/Negative Shovel Test Results, 31CD898 .....	166
24. Test Unit Data, 31CD898.....	166
25. Ceramic Artifact Inventory, 31CD898.....	170
26. Lithic Artifact Inventory, 31CD898.....	171
27. Vertical Distributions of Ceramics in Shovel Tests, 31CD898 .....	174
28. Vertical Distributions of Lithics in Shovel Tests, 31CD898 .....	177
29. Vertical Distributions of Artifacts in Test Unit 1, 31CD898.....	180
30. Vertical Distributions of Artifacts in Test Unit 2, 31CD898.....	181
31. Vertical Distributions of Artifacts in Test Unit 3, 31CD898.....	182
32. Vertical Distributions of Artifacts in Test Unit 4, 31CD898.....	183
33. Vertical Distributions of Artifacts in Test Unit 5, 31CD898.....	184
34. Vertical Distributions of Artifacts in Test Unit 6, 31CD898.....	185
35. Vertical Distributions of Artifacts in Test Unit 7, 31CD898.....	186
36. Vertical Distributions of Artifacts in Test Unit 8, 31CD898.....	187
37. Comparison of Positive/Negative Shovel Test Results, 31CD913 .....	201
38. Test Unit Data, 31CD913 and 31CD916 .....	203
39. Ceramic Artifact Inventory, 31CD913 and 31CD916.....	208
40. Lithic Debitage Inventory, 31CD913 and 31CD916 .....	209
41. Lithic Tool and Miscellaneous Inventory, 31CD913 and 31CD916.....	210
42. Ceramic Vertical Distributions, Shovel Tests, Sample Block 1, 31CD913 .....	214
43. Lithic Vertical Distributions, Shovel Tests, Sample Block 1, 31CD913 and 31CD916 .....	215
44. Artifact Vertical Distributions, TU1/TU2 Trench, 31CD913 .....	218
45. Artifact Vertical Distributions, TU3/TU4 Trench, 31CD913 .....	219
46. Artifact Vertical Distributions, TU5/TU6 Trench, 31CD913 .....	220
47. Artifact Vertical Distributions, TU7/TU8 Trench, 31CD913 .....	223
48. Occupations Identified in The Test Unit 7/8 Trench, 31CD913.....	224
49. Vertical Artifact Distribution, TU9, 31CD913.....	225
50. Vertical Artifact Distributions in Shovel Tests, North End 31CD916 .....	226
51. Artifact Vertical Distributions, TU10, North End of 31CD916.....	227
52. Comparison of Positive/Negative Level Shovel Test Results, 31CD919 .....	241

## *List of Tables (cont.)*

53. Test Unit Data, 31CD919.....	241
54. Inventory of Ceramics from Phase II Testing, 31CD919.....	246
55. Inventory of Lithic Debitage from Phase II Testing, 31CD919.....	247
56. Inventory of Lithic Tools and Miscellaneous Items from Phase II Testing, 31CD919.....	249
57. Vertical Distribution of Ceramics, Sample Block 1, 31CD919 .....	250
58. Vertical Distribution of Lithic Debitage, Sample Block 1, 31CD919 .....	254
59. Vertical Distribution of Stone Tools, Sample Block 1, 31CD919 .....	256
60. Vertical Distribution of Artifacts, Test Unit 1, 31CD919 .....	257
61. Vertical Distribution of Artifacts, Test Unit 2, 31CD919 .....	258
62. Vertical Distribution of Artifacts, Test Unit 3, 31CD919 .....	259
63. Vertical Distribution of Artifacts, Test Unit 4, 31CD919 .....	260
64. Vertical Distribution of Artifacts, Test Unit 5, 31CD919 .....	261
65. Vertical Distribution of Artifacts, Test Unit 6, 31CD919 .....	262
66. Vertical Distribution of Artifacts, Shovel Tests, Northeast Area, 31CD919.....	263
67. Vertical Distribution of Artifacts, Test Unit 7, 31CD919 .....	264
68. Vertical Distribution of Artifacts, Test Unit 8, 31CD919 .....	265
69. Vertical Distribution of Artifacts, Test Unit 9, 31CD919 .....	266
70. Comparison of Positive/Negative Shovel Test Results, 31CD924 .....	271
71. Test Unit Data, 31CD924.....	272
72. Inventory of Ceramics, 31CD924.....	277
73. Inventory of Lithic Debitage, 31CD924 .....	278
74. Inventory of Stone Tools and Miscellaneous Lithic Items, 31CD924.....	279
75. Vertical Distribution of Ceramics in Shovel Tests, 31CD924 .....	282
76. Vertical Distribution of Lithics in Shovel Tests, 31CD924 .....	285
77. Vertical Distribution of Artifacts in Test Unit 1, 31CD924 .....	286
78. Vertical Distribution of Artifacts in Test Unit 2, 31CD924 .....	287
79. Vertical Distribution of Artifacts in Test Unit 3, 31CD924 .....	288
80. Vertical Distribution of Artifacts in Test Unit 4, 31CD924 .....	289
81. Vertical Distribution of Artifacts in Test Unit 5, 31CD924 .....	290
82. Vertical Distribution of Artifacts in Test Unit 6, 31CD924 .....	290
83. Vertical Distribution of Artifacts in Test Unit 7, 31CD924 .....	291
84. Stage I Artifact Inventory, 31CD927 .....	300
85. Comparison of Positive/Negative Shovel Test Results, 31CD927 .....	303
86. Test Unit Data, 31CD927.....	305
87. Ceramic Inventory, 31CD927 .....	307
88. Lithic Artifact Inventory, 31CD927.....	308
89. Artifact Vertical Distributions in Shovel Tests, Sample Block 1, 31CD927 .....	310
90. Artifact Vertical Distributions, Test Unit 4, 31CD927.....	312
91. Artifact Vertical Distributions, Sample Block 2, 31CD927.....	313
92. Artifact Vertical Distributions, Test Unit 1, 31CD927.....	316
93. Artifact Vertical Distributions, Test Unit 2, 31CD927.....	317
94. Artifact Vertical Distributions, Sample Block 3, 31CD927.....	318
95. Artifact Vertical Distributions, Test Unit 3, 31CD927.....	319
96. Artifact Vertical Distributions, Test Unit 5, 31CD927.....	319
97. Comparison of Positive/Negative Shovel Test Results, 31HK1094 .....	327
98. Test Unit Data, 31HK1094 .....	327
99. Artifact Inventory, 31HK1094 .....	330
100. Artifact Inventory, Shovel Tests, Sample Block 1, 31HK1094 .....	333
101. Artifact Inventory, Shovel Tests, Sample Block 2, 31HK1094 .....	335
102. Artifact Inventory, Test Units, Sample Block 2, 31HK1094 .....	336
103. Comparison of Positive/Negative Shovel Test Results, 31HK1126 .....	346
104. Test Unit Data, 31HK1126.....	348

## *List of Tables (cont.)*

105. Artifact Inventory, 31HK1126 .....	350
106. Artifact Inventory, Sample Block 1 Shovel Tests, 31HK1126 .....	353
107. Artifact Inventory, Test Units in Sample Block 1, 31HK1126 .....	354
108. Artifact Inventory, Test Units in Sample Block 3, 31HK1126 .....	358
109. Negative/Positive Level Data for Shovel Test Intervals, 31HK1142.....	370
110. Test Unit Data, 31HK1142.....	370
111. Artifact Inventory, 31HK1142 .....	375
112. Artifact Inventory, Shovel Tests, Sample Block 1, 31HK1142 .....	376
113. Artifact Inventory, Test Units in Sample Block 1, 31HK1142 .....	378
114. Vertical Distributions of Ceramics and Lithic Debitage from Shovel Test Levels.....	382
115. Vertical Distributions of Lithic Diagnostics from Shovel Test Levels .....	382
116. Vertical Distributions of Ceramic Series from Shovel Test Levels .....	383
117. Vertical Distributions of Ceramic Series from Test Unit Levels .....	383
118. Vertical Distributions of Lithic Diagnostics from Test Unit Levels .....	384
119. Occupation Types from Sampled Deposits .....	397
120. Properties of Debitage Concentrations .....	398



## *Abstract*

The Public Works Business Center, under the administration of the National Park Service, sponsored this project to conduct archaeological testing and evaluation-related cultural resource management tasks at Fort Bragg, North Carolina. Palmetto Research Institute performed the Phase II testing and evaluation of 13 archaeological sites under a Contract # C5890020435 with the National Park Service that was structured to extend up to a period of five years and to be administered in separate delivery orders. This project (D5095020469) is the first of a series of delivery orders (DO#1) to be conducted under the agreement. The Phase II investigations were undertaken in compliance with the National Historic Preservation Act (Public Law 89-665, as amended by Public Law 96-515) Guidelines for Federal Agency Responsibilities, under Sections 106 and 110 of the National Historic Preservation Act, Army Regulation AR 200-4, and 36 CFR 800 (Protection of Historic and Cultural Properties).

Fieldwork was conducted between January 7 and June 13, 2003. John Cable served as Principal Investigator for the project and Charles Cantley served as Field Director. David Port assisted as crew chief for the four historic sites included in the package and Carl Steen provided technical oversight and input for the testing strategies developed for the historic sites.

A summary table containing pertinent management information for the nine prehistoric sites evaluated under this delivery order is provided at the end of this abstract. Three of these sites (31CD898, 31CD913, and 31CD924) are recommended eligible for inclusion on the National Register of Historic Places under criterion "d" for their scientific value. All four of the historic sites (31CD815\*, 31CD832\*, 31HK1101\*, and 31HK1109\*) were recommended eligible include for the National Register of Historic Places and they are reported in a companion report authored by Steen (2005).

All nine of the prehistoric sites represent seasonal reoccupations by a wide range of cultural groups extending over a period of at least 10,000 years. Each contains a degree of integrity and decisions concerning eligibility were based on redundancy, component representation, and the relative comprehensiveness of the data collected during Phase II investigations. The three Hoke County sites (31HK1094, 31HK1126, and 31HK1142), by virtue of their low reoccupation intensity and small sizes, were shown to have relatively undisturbed Archaic camps comprised of either nuclear families or special purpose hunting or gathering task groups. Disproportionate effort was extended on these sites to first demonstrate that they contained information of importance to settlement pattern reconstruction and second to gather sufficient data to obviate the need to preserve them in the NRHP system. All three yielded important data on Archaic camp structure, but they were sampled at such a high intensity that it was argued that further work on these sites would not substantially advance our understanding of Archaic systems in the region further. Consequently, none were recommended eligible for the NRHP. Many other sites of similar structure still exist in the region and can be drawn on to supplement the sample recovered from the small Hoke County sites. A similar approach was applied to 31CD810, another small, lightly reoccupied site with both Archaic and Woodland components. The remaining five prehistoric sites (31CD898, 31CD913, 31CD919, 31CD924, and 31CD927) are larger, more heavily reoccupied, and are situated in a tight cluster in the upper watershed McPherson Creek. Here, redundancy and component preservation were used to evaluate the sites. 31CD898 and 31CD913 were recommended eligible for the NRHP for their intensive Early, Middle and Late Woodland occupations, while 31CD924 was recommended eligible for its extensive and well-preserved Archaic occupation. Together, these three sites should provide a nearly complete view of the character of prehistoric occupation in the upper McPherson Creek drainage system. Sites 31CD919 and 31CD927 were recommended ineligible due to poor preservation and redundancy of occupation history.

Management Summary Table, DO1

Site	GPS: Differential Corrections				Identified Components	Recommendation
	NAD27		NAD83			
	Northing	Easting	Northing	Easting		
31CD810	3888926.86	672517.89	3889138.23	672535.15	Early Archaic; Guilford; Thom's Creek; Early and Middle Woodland	Not Eligible
31CD815	3889263.86	673374.98	3889476.86	673392.29	Late 19th/Early 20th Century Tenant Farm House	Eligible
31CD832	3889429.67	675318.34	3889640.42	675331.52	Middle to Late 19th and Early 20th Century Home Site	Eligible
31CD898	3890585.11	676421.18	3890798.12	676438.50	Guilford; Early, Middle, and Late Woodland	Eligible
31CD913	3889138.75	678287.78	3889358.70	678303.79	Early Archaic; Morrow Mountain; Briar Creek; Early, Middle and Late Woodland	Eligible
31CD919	3889650.12	677936.60	3889856.41	677951.32	Early Archaic; LeCroy, Morrow Mountain, Early, Middle, and Late Woodland	Not Eligible
31CD924	3889575.30	678268.91	3889788.15	678282.34	Big Sandy; Middle and Late Woodland	Eligible
31CD927	3889872.11	678274.49	3890088.13	678288.84	LeCroy; Morrow Mountain; Halifax; Middle and Late Woodland	Not Eligible
31HK1094	3891141.58	653045.99	3891356.10	653067.93	Savannah River	Not Eligible
31HK1101	3891458.84	653716.46	3891671.85	653733.65	Late 19th/Early 20th Century Tenant Farm House	Eligible
31HK1109	3891119.13	653878.20	3891320.53	653899.65	Late 19th/Early 20th Century Tenant Farm House	Eligible
31HK1126	3891144.74	657915.74	3891353.46	657929.24	Stanly; Morrow Mountain	Not Eligible
31HK1142	3890355.34	655418.20	3890564.65	655435.68	Archaic	Not Eligible

# Chapter 1. Introduction

The Public Works Business Center, under the administration of the National Park Service, sponsored the current project to conduct archaeological testing and evaluation-related cultural resource management tasks at Fort Bragg, North Carolina (Figure 1). Palmetto Research Institute performed the Phase II testing and evaluation of 13 archaeological sites under a Contract # C5890020435 with the National Park Service that was structured to extend up to a period of five years and to be administered in separate delivery orders. This project (D5095020469) is the first of a series of delivery orders (DO#1) to be conducted under the agreement. The Phase II investigations were undertaken in compliance with the National Historic Preservation Act (Public Law 89-665, as amended by Public Law 96-515) Guidelines for Federal Agency Responsibilities, under Sections 106 and 110 of the National Historic Preservation Act, Army Regulation AR 200-4, and 36 CFR 800 (Protection of Historic and Cultural Properties).

Fieldwork was conducted between January 7 and June 13, 2003. John Cable served as Principal Investigator for the project and Charles Cantley served as Field Director. David Port assisted as crew chief for the four historic sites included in the package and Carl Steen provided

technical oversight and input for the testing strategies developed for the historic sites. Crew that worked on the project from time to time consisted of Anna Dabir Banguilan, David Mallet, Elizabeth Farkas, Elizabeth Haywood, Genevieve Brown, and Sean Taylor. Fieldwork consumed 530 person days.

The nine prehistoric sites selected for evaluation in DO#1 are situated in two separate areas of the Fort. Six of the sites are situated in Cumberland County in the upper watershed of McPherson Creek on the north slope of the watershed divide between Little River and Rock Fish Creek (Figure 2). Four of these sites, 31CD913, 31CD919, 31CD924, and 31CD927, are tightly clustered on a single, broad ridge finger leading down to the confluence of McPherson Creek and an unnamed tributary. Situations like this provide the opportunity to effectively consider redundancy as a basis for site evaluation. The remaining two prehistoric sites in Cumberland County, 31CD810 and 31CD898, are situated near the headwaters of other drainages that are tributaries of Little River. The remaining three prehistoric sites are located in Hoke County (Figure 3) in similar headwater locations at the edge of the watershed divide between Little River and Rock Fish Creek. Two of the sites, 31HK1126 and 31HK1142, are situated at

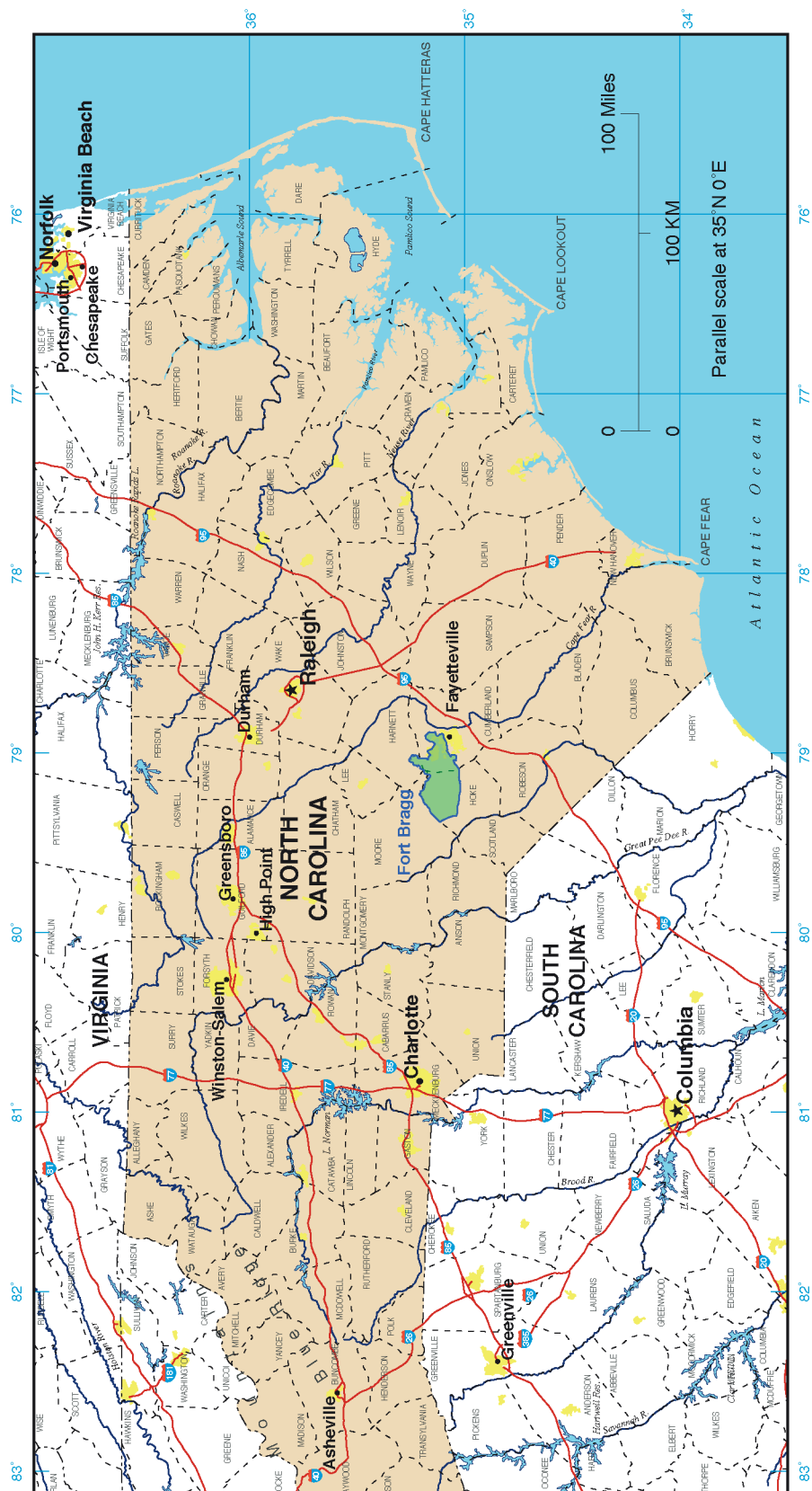


Figure 1. Location Map, Fort Bragg, NC



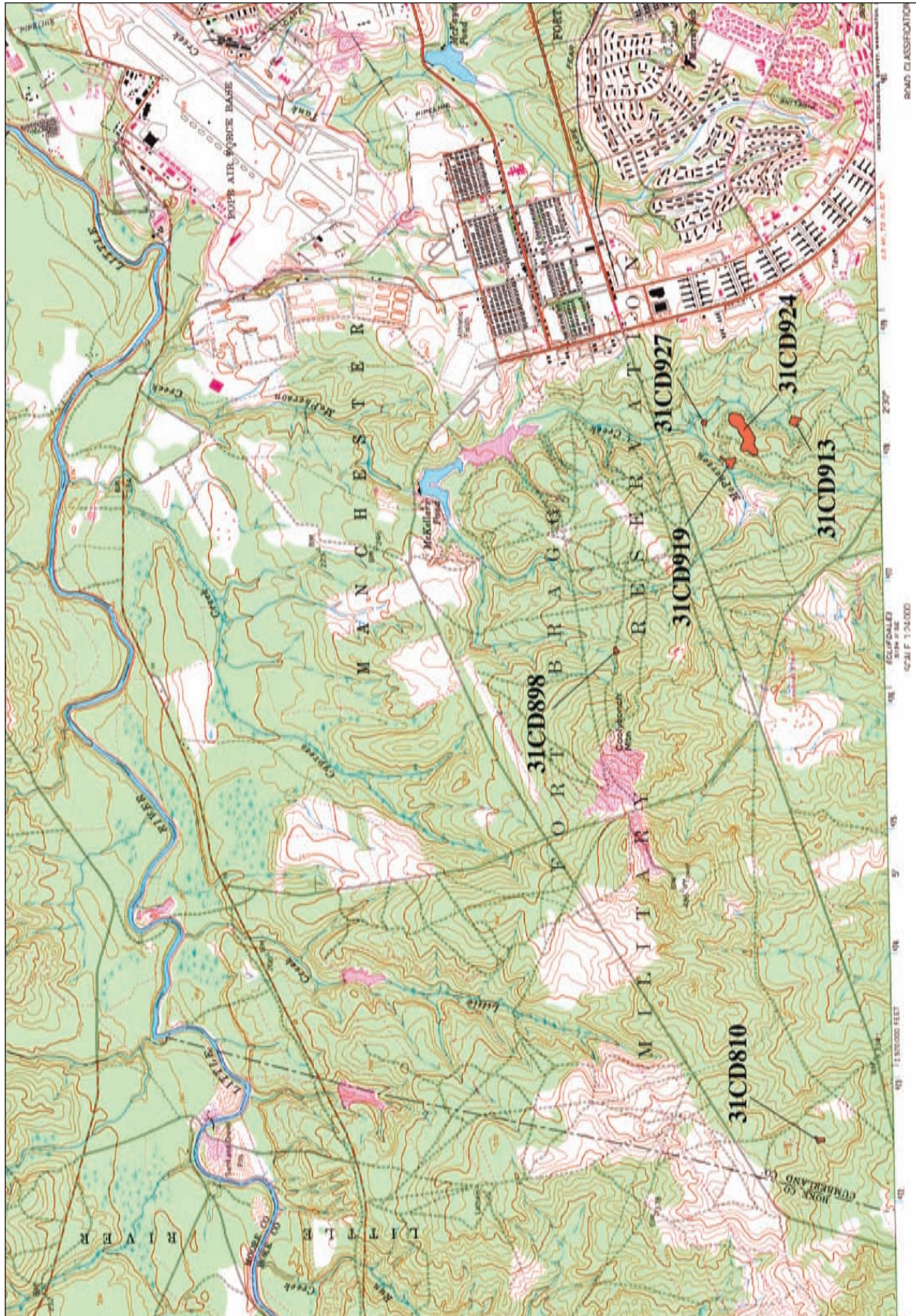


Figure 2. Location of Cumberland County Prehistoric Sites (Overhills, NC 1957, PR1971, 7.5 Minute USGS ; Scale 1:48000)



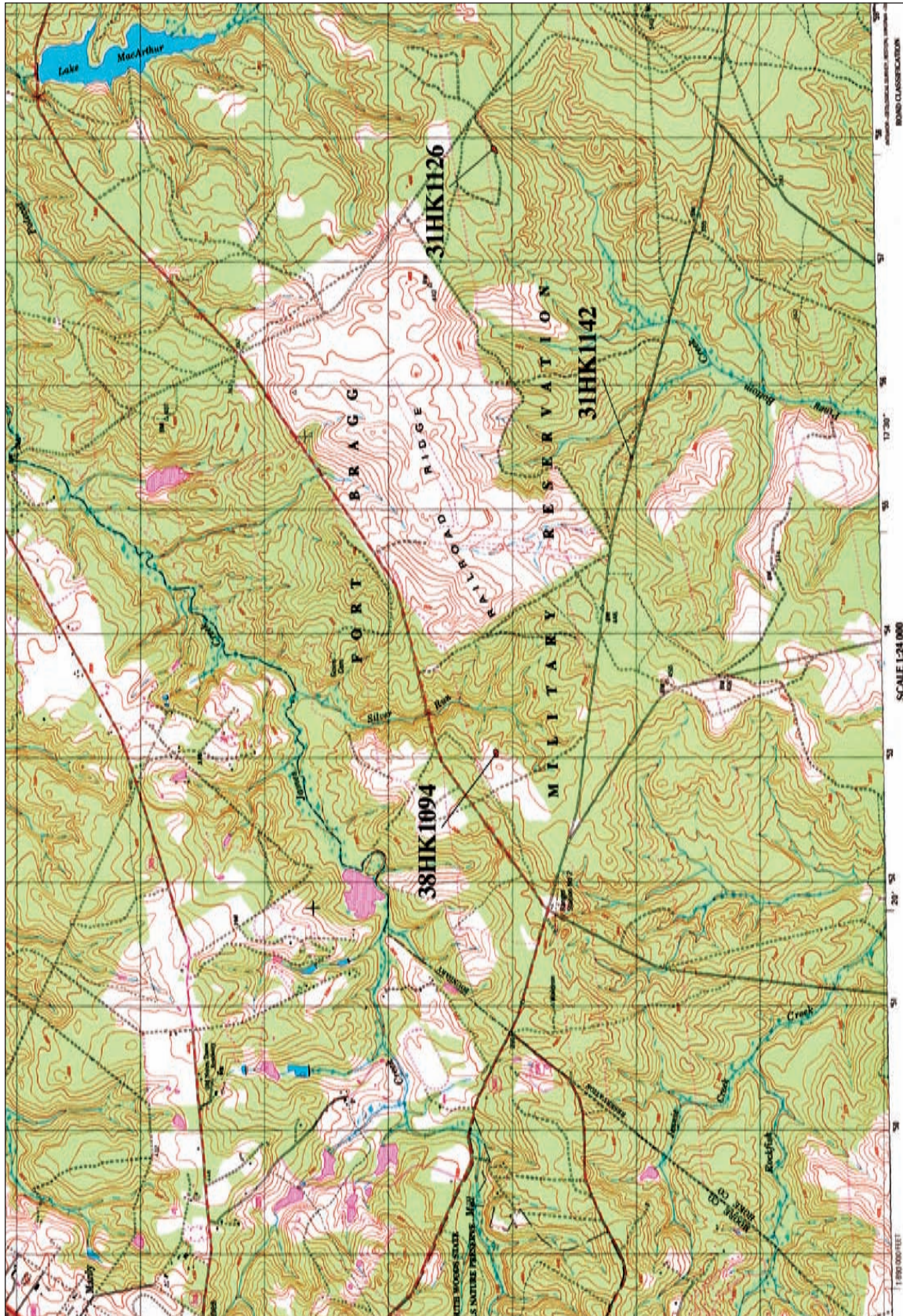


Figure 3. Location of Hoke County Prehistoric Sites (Niagra, NC, 1998, 7.5 Minute USGS ; Scale 1:48000)



the upper reaches of Piney Bottom Creek, which runs into Rock Fish Creek to the south. The other site, 31HK1094, rests on a high ridge finger overlooking Silver Run Creek, a tributary of Little River. Three of the prehistoric sites, 31CD898, 31CD913, and 31CD924 are recommended eligible for inclusion on the National Register of Historic Places.

The four historic sites are located in the same general areas as the prehistoric sites. Sites 31CD815 and 31CD832 are historic house sites situated in what Steen refers to as the Longstreet study area (Figure 4). Both sites border on an historic road next to present present-day Longstreet. The Hoke County historic sites, 31HK1101 and 31HK1109, are located between an historic road and Silver Run Creek and hence have been assigned to the Silver Run study area by Steen (Figure 5). They rest on top of a broad landform known as Railroad Ridge. All of these sites contain well-preserved structural remains and readily definable functional zones and are recommended eligible for inclusion on the National Register of Historic Places. Investigations at the historic sites are described in a second report authored by Steen (2005).

This report presents the results of the prehistoric site investigation and contains 16 chapters including this introduction. Chapter 2 presents an environmental overview of the Sandhills region surrounding Fort Bragg. The research design and general field and analytical methodologies are described in Chapter 3. Chapter 4 presents a culture historic overview of the prehistory of the region. Chapters 5 and 6 respectively describe the lithic and ceramic artifacts recovered during the investigations. Chapters 7 through 15 describe the field investigations and eligibility evaluations for each of the prehistoric sites. Chapter 16 provides a summary of evaluations and develops a synthetic interpretation of the results.

Data appendices are provided in CD format at the back of the volume. Appendix A contains the differentially corrected GPS coordinates for each of the site data. Appendix B presents the lithic artifact database and Appendix C provides descriptions of the lithic raw material subtypes identified during analysis. Appendixes D through J contain metric and attribute data for the various lithic tool and core categories. Respectively, these include cores, bifaces, projectile points, unifaces, retouched flakes, utilized flakes, and cobble tools. Appendix K presents the ceramic artifact database. Appendix L presents the provenience data for each of the sites discussed in the report, identifying negative as well as positive recovery units and loci. Finally, Appendixes M, N, and O list data respectively on faunal and ethnobotanical remains, historic artifacts, and special samples.





Figure 4. Location of Cumberland County Historic Sites in the Longstreet Study Area (Overhills, NC 1957, PR1971, 7.5 Minute USGS ; Scale 1:48000)



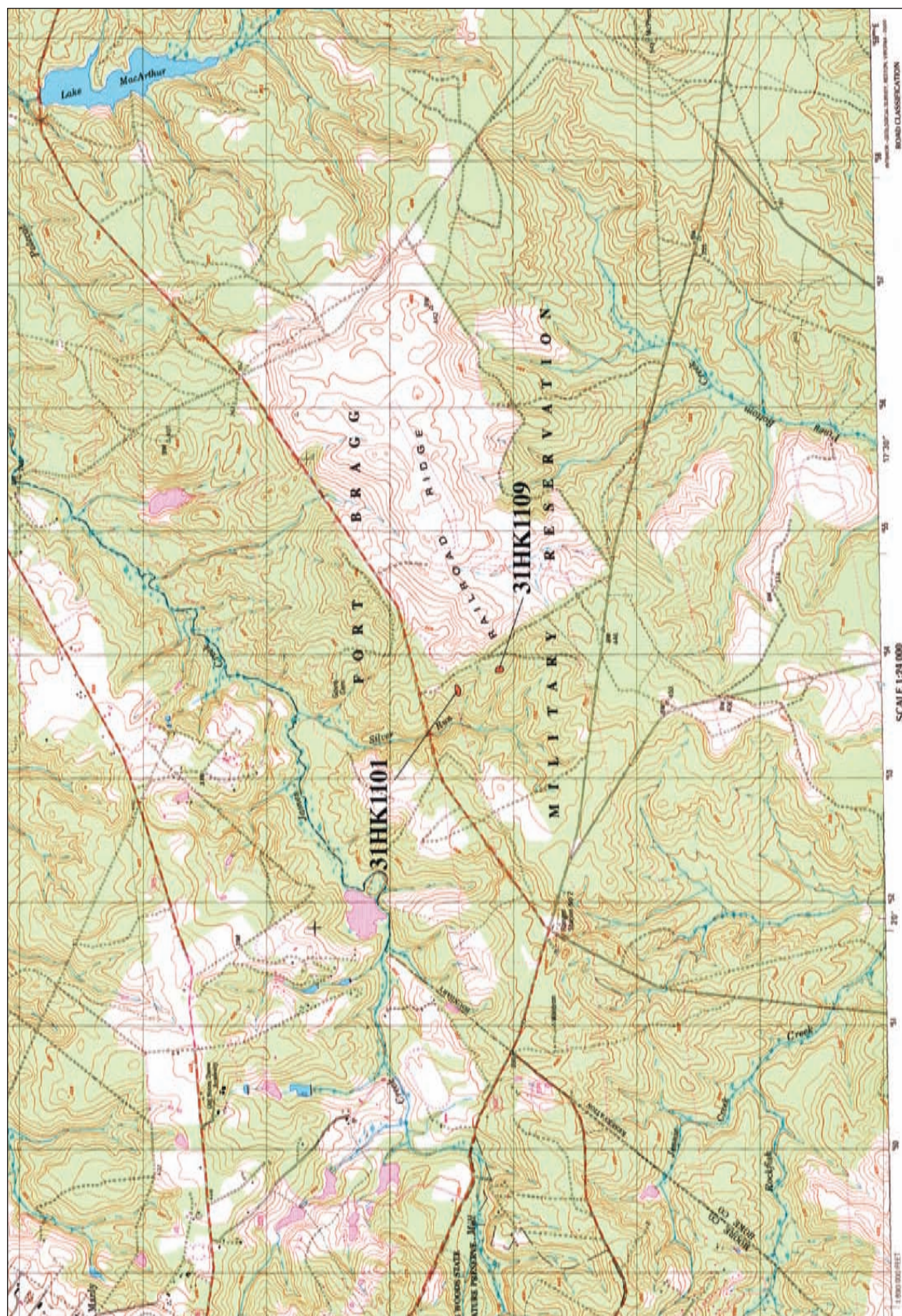


Figure 5. Location of Hoke County Historic Sites, Silver Run Study Area (Niagra, NC, 1998, 7.5 Minute USGS ; Scale 1:48000)



# Chapter 2. Environment

## INTRODUCTION

Ethnohistoric accounts of early historic Indian groups indicate that the inter-riverine upland zones of the Coastal Plain region were occupied only on a seasonal or temporary basis and primarily served as locations for gathering nuts and plant material as well as hunting game (Jones 1978; Waddell 1980; Cable and Cantley 1998; Cantley and Cable 2002). Archeological investigations within this zone tend to suggest that this pattern of land use typified the earlier prehistoric period of occupation as well. Of course, it is not unlikely that the specific settlement and subsistence strategies of the groups that utilized this zone varied over time as shifts in overall patterns of adaptation occurred. It is through the definition and analysis of these subtle variations in land use that the archeology of this zone can contribute to a broader understanding of the character of prehistoric human settlement in the Sandhills and inner Coastal Plain of North Carolina.

## REGIONAL PHYSIOGRAPHY

Fort Bragg is located in the Sandhills physiographic province, which forms a narrow

band of xeric, sandy uplands stretching from Virginia south/southwest to Texas. In North Carolina, the Sandhills region ranges from approximately 5–40 miles in width, and is bounded by the Piedmont/Fall Line to the west and the Coastal Plain to the east (Figure 6). The region is characterized by gently undulating topography with well-defined, broad ridges with gentle slopes in upland locations and more broken terrain along streams (Colby 1958:27; Hudson 1984:2). It slopes toward the south and east with elevations ranging from a low of 270 feet AMSL to its highest point of 527 feet AMSL near McCain, in Hoke County (Hudson 1984:2).

Fort Bragg sits on a watershed divide with its northern half feeding into the Lower Little River drainage, and its southern half drained by tributaries of Rockfish Creek. Both the Lower Little River and Rockfish Creek flow eastward until they join the Cape Fear River, which eventually empties into the Atlantic Ocean near Wilmington, North Carolina. The Sandhills region and its coarse sandy uplands acts as a natural aquifer creating abundant underground sources of water (Colby 1958:27). Percolation of rainfall is often interrupted by underlying argyllic or clayey horizons that funnel the water laterally, creating numerous springs or seepages on side slopes that



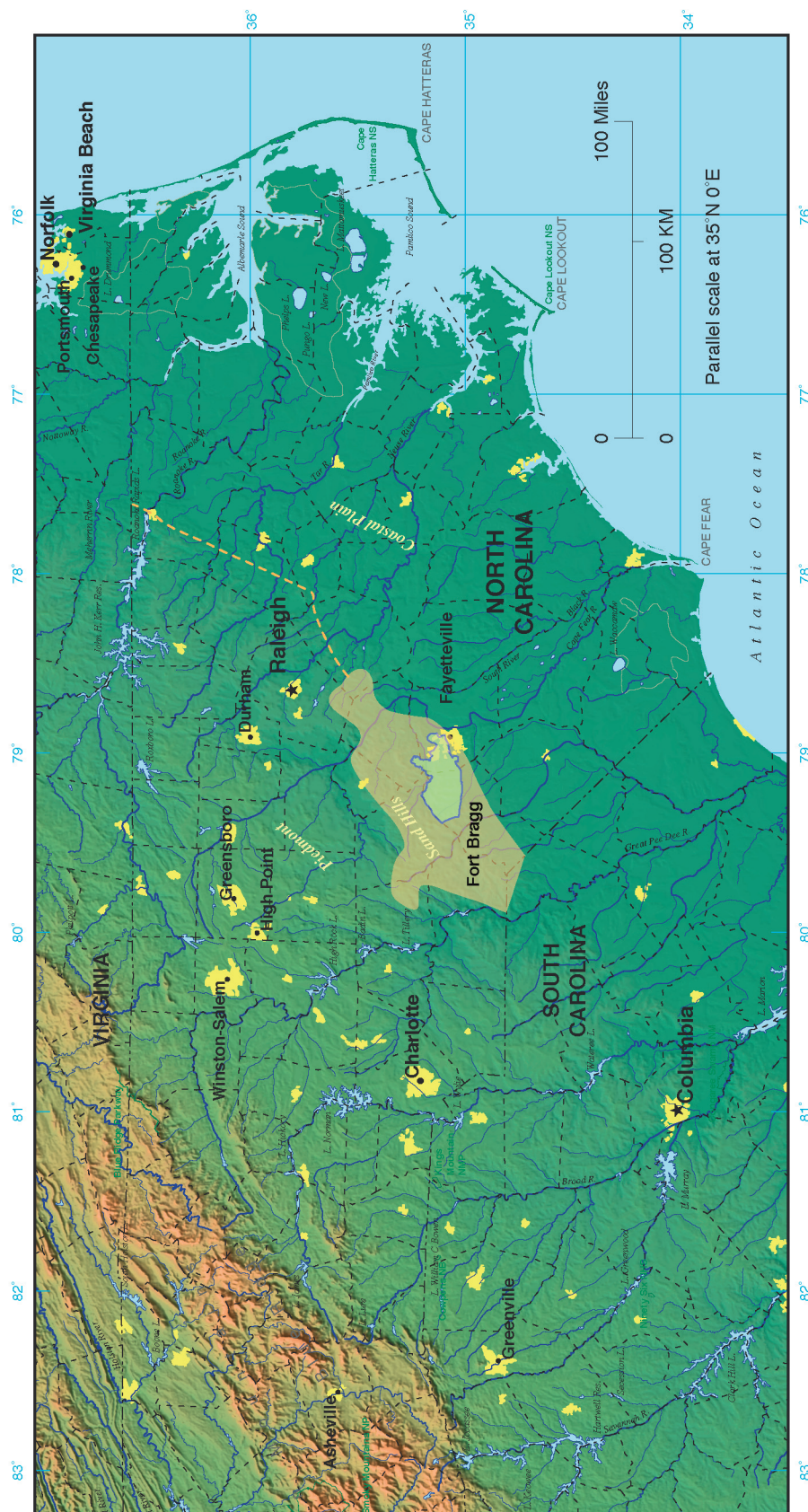


Figure 6. Physiographic Regions Surrounding Fort Bragg, NC

provide the origin of many first order streams in the project area (Benson 1998:6; Clement et al. 1997). Previous studies (Braley and Schuldenrein 1993; Clement et al. 1997; Loftfield 1979) have documented the importance of these springs or seepages to prehistoric settlement in the region.

## GEOLOGY AND SOILS

Located east of the Fall Line, the bedrock in the Sandhills is composed of volcanic rock that is encountered at depths of 60 to 122 meters below ground surface (Hudson 1984:2). Overlying this bedrock are Cretaceous period (135–65 million years ago or mya) cross-bedded sands containing clay balls and iron-cemented concretions or ferricretes, sandstone, and mudstone (Bartlett 1967; USDA 1984:2; North Carolina Geological Survey 1985) attributed to the Cape Fear and upper Middendorf formations. The Cape Fear formation deposit is a non-marine delta formation, which is often exposed along entrenched streams in the project area (Sohl and Owens 1991:191–192, 220). The relationship between the Cape Fear formation and underlying bedrock can be seen near Erwin, North Carolina where the Cape Fear River has cut into the underlying crystalline, metamorphic basement, and contains numerous small boulders and gravel. Further downstream, these gravels decrease in size and abundance and the formation is dominated by inter-bedded clays and sands (Sohl and Owens 1991:192). In contrast to the Cape Fear formation sands, Middendorf sands and gravels are more frequently exposed along valley slopes and eroded ridges (Bartlett 1967). Dating to the later Tertiary period (65–2 mya), the Middendorf age material is thought to have been transported by streams and rivers originating in the Piedmont and re-deposited in the project area. The upper layer of the Middendorf deposit (also referred to as the Tuscaloosa formation by some researchers) contains small quartz gravels, which could have been utilized by prehistoric groups.

Idol and Pullins (2001:21) noted the presence of pebble-sized gravels along the side slopes of ridges, but failed to find definitive evidence for their use as a raw material for the production of stone tools. Observations made by the authors of firebreak cuts along the side and toe slopes of some ridges indicate the presence of pebbles and gravels or cobbles measuring up to 10 cm in diameter. This observation in addition to the recovery of a relative large number of cortical flakes and cobble fragments on sites above these firebreaks suggest that material from this geologic formation was exploited when possible.

West of Fort Bragg is the Piedmont Physiographic Province that consists of a series of northeast/southwest-trending lithotectonic belts. The belts are defined by the age and metamorphic grades of rock found in each belt and are named, from east to west, the Carolina Slate Belt, Charlotte Belt, Kings Mountain Belt, and the Inner Piedmont Belt (Overstreet and Bell 1965). This study is concerned primarily with the Carolina Slate Belt. Generally, each lithotectonic belt contains rocks of higher-grade metamorphism near the belt's center and rocks of lesser metamorphic grades along their perimeters. In some cases, geologic discontinuities (faults) mark the boundary between two belts. Scientific dating of the belts by K-Ar, Rb-Sr, and  $^{40}\text{Ar}/^{39}\text{Ar}$  methods indicate that the regional metamorphic events that created the belts occurred at different times and in some belts, at more than one time between 510–265 million years ago (Ma) (Butler 1991:127, 129). Diabase dikes that resulted from later periods of volcanic activity (195–205 Ma) also are distributed throughout the belts.

The Carolina Slate Belt is dated to the Taconic orogeny (500–450 Ma) and it consists of sedimentary and volcanic rocks that were subjected to low-grade regional metamorphism and intrusive igneous dikes. Sedimentary rocks found in this belt occur in the Fall Line district and vary

from bedded and finely laminated to massively bedded deposits of graywacke, siltstone, sandy siltstone, and fine sandstone. The predominate rock type found in this belt is finely laminated slate (metamorphosed siltstone) which also has been misidentified as volcanic slate, shale, mudstone, argillite, and siltstone. Quartzite (metamorphosed sandstone), conglomerate (sedimentary), and limestone (sedimentary) occur less frequently in this belt. In addition to the sedimentary and metamorphic rocks, both flow and pyroclastic types of volcanic rocks occur in the Carolina Slate Belt. These rocks are inter-bedded with the metamorphic and sedimentary rock formations and include such types as felsic tuff, welded vitric tuff, breccia, flow banded rhyolite, porphyritic rhyolite, plain rhyolite, and basalt (Novick 1978:427–431). Although these latter rock types comprise much of the prehistoric lithic assemblages found in the Sandhills region and at Fort Bragg, most known outcrops and quarry sites occur in the south-central Piedmont province, a distance of approximately 60 km (40 miles). At present, the closest known outcrop of metavolcanic bedrock is located 15 km west at the Moore/Hoke County line (Braley 1990; North Carolina Department of Conservation and Development 1958), near Camp Mackall. Another possible source of this material could exist along the ancient terraces and floodplain of the Cape Fear River. The river could have cut through older cobble-laden delta deposits and/or moved cobbles to levee or point bar locations accessible to prehistoric groups. At present, systematic studies of the Cape Fear valley and its potential as a raw material source area, has gone unrealized.

Other rock types found in the Carolina Slate Belt that have archeological importance include intrusive igneous dikes, and other rock types associated with dike formation or fault alteration that include rocks of siliceous and mafic origin. Intrusive igneous dikes are common along the eastern boundary of the belt

near the Fall Line. These dikes contain olivine diabases of mafic origin (Ragland 1991:174) and vary in width from 0.9-30 m (3-100 ft) (Sundelius 1970:363). South of Fort Bragg in Chesterfield County, South Carolina, abundant quartz veins occur along the Pageland fault zone where they crosscut argillites and metavolcanic rocks of the South Carolina slate belt (Luce and Bell 1981:9). Possibly of archaeological importance, geological studies conducted along the Pageland Fault zone indicate that siliceous rocks and/or quartz veins occur where the fault trace crosses areas consisting of argillites and other metavolcanic derived bedrock. Conversely, in areas where the fault zone crosses non-metavolcanic bedrock, siliceous rocks and quartz rarely occur as large veins. If this observation is true for other areas within the slate belt then future studies of dikes or fault zones may prove valuable for predicting the possible locations of high-grade, siliceous raw materials that were highly sought after for stone tool manufacture (Abbott et al. 2001, Cantley 2000).

Blaney, Gilead, and Lakeland soil associations that are found on broad areas of nearly level and gently sloping topography characterize the project area. These soils are differentiated by minor differences in color hues for their respective profiles that distinguish between the individual soil types comprising the associations. All of the sites included in the present project are located on areas mapped as Blaney loamy sand, Candor sand, and Vacluse loamy sand.

The Blaney loamy sand (BaB) profile provided in the soil survey is summarized as follows. The surface horizon is typically a plowed or disturbed A-Horizon about 10-cm thick consisting of dark grayish brown (10YR 4/2) loamy sand with weak fine friable granular structure. The A horizon is underlain by an E horizon, or an older and depleted A horizon, which contains 10 to 63-cmbs of light yellowish brown (2.5Y 6/4) loamy sand,



single grained. Substrata horizons vary between 63 and 85 cmbs, labeled as the Bt1 horizon – brownish yellow (10YR 6/6) sandy clay loam, and the Bt2 horizon that is characterized as red-dish-yellow (7.5YR 6/6) sandy clam loam, which occurs between 85 and 155 cmbs. These substrata horizons feature weak, medium-to-coarse subangular blocky structures that are firm yet brittle in places (Hudson 1984).

Candor sand (CaB) is similar to the Blaney soil mapping series. It contains an Ap horizon, which is described as dark grayish brown (10YR 4/2) sand extending from 0 to 23 cmbs (Hudson 1984). An older E horizon, characterized as yellowish-brown (10YR 5/4) sand ranges from 23 to 50 cmbs. Underlying this zone, a Bt horizon of yellowish-brown (10YR 5/6) loamy sand, is evident from 50 to 75 cmbs. Substrata zones are depicted as an E'1 horizon of brownish yellow (10YR 6/6) single grained sand occurring between 75 and 83 cmbs and an E'2 horizon of similar composition occurring at 83 to 150 cmbs. Other horizons include a B't horizon described as strong brown (7.5YR 5/6) sandy clay loam occurring between 150 and 200 cmbs, and an underlying BC horizon when present. The undulating horizons have developed from residuum processes where strata are buried from the ridge crest downward to the side slopes.

Vaucluse loamy sand (VaB) also belongs to the Blaney-Gilead-Lakeland mapping unit (Hudson 1984). This series consists of well-drained soils with an A horizon from 0 to 10 cm thick, consisting of dark grayish brown (10YR 4/2) loamy sand with weak fine friable granular structure. The A horizon is underlain by an E horizon extending from 10 to 23 cmbs consisting of yellowish brown (10YR 5/4) loamy sand intermixed with fine quartz grains. Various Bt horizons are represented in this unit. The Bt1 horizon is composed of yellowish red (5YR 5/6) sandy clay loam occurring between 23 and 63 cmbs. The Bt2

horizon consists of yellowish red (5YR 5/8) sandy clay loam with distinct red (2.5YR 4/8) and yellowish brown (10YR 5/8) mottled sand inclusions occurring between 63 and 93 cmbs. Finally, the Bt3 horizon of red (2.5YR 4/8) sandy clay loam occurs between 93 and 125 cmbs. Like Candor sand, the Vaucluse series also derives its underlying horizons from loamy sediments formed on upland slopes.

## REGIONAL CLIMATE

Relatively short, cold winters and hot, humid summers typify the modern climate of the study area. Average daily temperature for the winter in Fayetteville is 44 degrees Fahrenheit with an average minimum of 31 degrees. Winter precipitation originates from continental fronts out of the north and west. Summers are dominated by warm, moist, tropical air masses, and precipitation during this season is generally produced by convection storms. The average daily temperature for the summer in Fayetteville is 78 degrees with an average maximum of 89 degrees. Precipitation is distributed nearly even throughout the year with 60 percent of the rainfall between the months of April and September. Average annual precipitation is equal to 43 inches, of which, approximately 3 inches falls as snow (Hudson 1984:2). Spring usually represents the driest season, but rare drought conditions can occur in the fall.

## BIOGEOGRAPHY OF THE INTER-RIVERINE UPLANDS

Within the project vicinity, three different ecosystems are known to exist. The most prominent of these in the immediate project vicinity is the upland forest communities generally assignable to oak-pine (Braun 1950), longleaf pine-wire grass, and loblolly-shortleaf pine associations.

These upland communities are concentrated on the tops and side slopes of ridge systems. Secondly, swamp or wetland communities form within the project vicinity at poorly drained locations such as river bottoms and in the uplands near seeps or springs. Freshwater stream environments constitute the third ecosystem, which is confined to river and tributary channels.

From the perspective of prehistoric subsistence, the inter-riverine uplands of the Coastal Plain have been characterized as a perpetual “food-poor” pine barren, dominated by long-leaf pine forest with very low species diversity (Larson 1970, 1980, Milanich 1971). Reconstructing pre-European forest distributions, however, is a difficult task due to the great successional impacts of historic (and also prehistoric) land use and, consequently, much controversy exists concerning the composition and distribution of “pristine” climax vegetation in the Southeastern United States (Delcourt and Delcourt 1977, 1987; Quarterman and Keever 1962; Shelford 1963).

Quarterman and Keever (1962) have argued that the current closed canopy loblolly-shortleaf pine dominated forests of the Coastal Plain are the product of modern forestry management practices and other types of historic land use, and that these forests are replaced by a Southern mixed hardwood climax when allowed to mature. Nevertheless, given the abundance of sub-climax soil conditions (e.g. saturation), it is probable that natural forests would have resembled a mosaic of mixed hardwood and pine associations prior to the nineteenth century (Brooks and Canouts 1984:10-13, Widmer 1976:9). William Bartram’s description of the interior Coastal Plain along the Savannah River in the late eighteenth century conforms well to this reconstruction (Harper 1958:19-20).

Sub-climax conditions also appear to have been fostered by forest fires, which tend to inter-

rupt normal successional processes. An important and once abundant community that is maintained principally by fire is the longleaf pine-wiregrass association (Platt et al. 1988:491, Russo et al. 1993). It is estimated that this association has been reduced by as much as 98 percent since pre-settlement times because of modern forestry practices (Bennett and Pittman 1991, Croker 1987, Noss 1989). In its pristine state, this community consists of homogeneous and scattered stands of mature longleaf pine intermixed with occasional oaks and dense clumps of young pines. The understory is composed of low-lying forbs, shrubs, and grasses. Wiregrass is identified as a dominant in this community because of its consistent association with longleaf pine in old-growth tracts, a factor brought about by its own dependence on fires for reproduction. Forestry studies contradicting earlier assumptions indicate that longleaf pine-wiregrass associations are actually characterized by high species diversity rather than ecological homogeneity (Frost et al. 1986).

The role of Native Americans in perpetuating and fostering longleaf pine forests and savannahs through controlled burning has also been appreciated for some time (Platt et al. 1988, Robbins and Myers 1989). Ethnohistoric accounts indicate that a popular form of surround hunting employed by Southeastern aboriginal groups involved the use of fire lines of several miles in extent set in the dried detritus of the forest floor (see accounts by Bartram, Calderon, DuPratz, Lawson, and Smith in Swanton 1946:319-320). Such practices would have regularly removed the young seedlings of climax species, preventing them from maturing at a normal rate. In combination with other land modification involving the clearing of forest for settlements and agricultural fields, aboriginal land use practices not only perpetuated sub-climax forests, but also created pine parklands or savannas.



Widmer's (1976) model for reconstructing the pre-settlement (pre-European) vegetation of the interior uplands is useful when examining the Coastal Plain's forest structure. He identified three "pristine" subsystems, including the southern mixed hardwood forest, the longleaf pine forest and pine savannas. The latter two represent sub-climax communities owing their existence to both natural and cultural causes, while the former constituted the mature climax vegetation of pre-settlement times. Upland communities were primarily restricted to the ancient terraces and ridges where soils were drier. Pine-savannas, however, were a specialized community associated with aboriginal swidden or field-rotation agriculture and were primarily confined to well-drained bottomland and stream terraces.

In the Inner Coastal Plain region, the mixed hardwood subsystem is composed of two basic community types in the vicinity of the project area today: 1) mesic slope hardwoods, and 2) upland mesic hardwoods. These two communities appear to approximate the normal range of variability associated with the mixed hardwood subsystem on the Coastal Plain of North Carolina. The structure and composition of the mesic slope hardwood communities correspond closely with Braun's (1950) mixed mesophytic forest type. In the lowlands of the Southeast, such communities typically occur on dissected river bluffs, ravines and high bottomland where edaphic conditions are moist but well drained. This community has also been referred to as "beech ravine" (Kohlsaatt 1974), "ravine slope" (Hartshorn 1972), or "bluff and slope forest" (Wharton 1978) in more locally based studies. Dominants in the North Carolina mesic slope hardwood communities consist of beech, bull bay, laurel oak, red maple, black gum, tulip tree, sweet gum, and loblolly pine. The upland mesic hardwoods community corresponds to Braun's (1950) "oak-hickory forest" type and represents the climax vegetation of the Coastal Plain according to Quarterman and Keever

(1962). Dominants of this community, which tend to occupy the majority of the area on ridge tops, consist of beech, laurel oak, bull bay, white oak, sweet gum, mockernut hickory, water oak, southern red oak, pignut hickory, and black gum.

The long leaf pine subsystem occurs in xeric, well-drained, sandy locations, seasonally flooded landforms and in mesic situations where fire has interrupted but not inhibited successional processes. (Bennett and Pittman 1991, Platt et al. 1988, Sandifer et al. 1980:439, Noss 1989:211). Fire-maintained stands of long leaf pine may contain only a two-tiered structure including a canopy of predominantly long-leaf pine and a limited herbaceous layer composed of such commonly abundant species as wiregrass, ported nut rush, camphorweed, beggar ticks, panic grass, broom-straw, bracken fern, aster, goat's rue, and thoroughwort. In the successional phase of development, however, these forests are generally three-tiered, containing in addition a tall shrub layer. Other dominants common to both areas include immature pines and hardwoods, wiregrass, bitter gallberry, running oak, stagger bush, blueberry, and huckleberry. The successional type eventually develops into mixed pine and pine-mixed hardwood communities. In these communities, long leaf pine is often replaced by slash, loblolly, and short-leaf pine species. These successional types were not as common in prehistoric times, but the intensity of land modification was probably sufficient to perpetuate these associations in one form or another in restricted patches.

Unfortunately, very little is known about the pine-savanna subsystem. Lawson (Lefler 1967:34) provides a description of one large patch of savanna adjacent to a Congaree settlement in 1701:

*... about Noon, we pass'd by several fair Savanna's, very rich and dry; seeing great Copses of many Acres that*

*bore nothing but Bushes, about the bigness of Box-trees; which (in the Season) afford great Quantities of small Black-berrys.... Hard by the Savanna's we found the Town.... The Town consists not of above a dozen Houses, they having other stragling Plantations up and down the Country, and are seated upon a small Branch of Santee River. Their Place hath curious dry Marshes, and Savanna's adjoining to it, and would prove an exceeding thriving Range for Cattle, and Hogs....*

Lawson's use of the term plantations conveys the impression that much of the river valley margin of each of the tribes he described was punctuated with these clearings, or savannas, and that some patches were planted while the majority were unattended. The distribution of the Santee plantations, for instance, was described by Lawson as "lying scattering here and there, for a great many Miles" (Lefler 1967:24-25). The presence of bushes and briars on the Congaree savannas, moreover, suggests that the abandoned fields may have been maintained within a fallow rotation, as the early successional stage evidenced by this scrub vegetation would have been replaced by immature pines and hardwoods within 5-20 years after abandonment of the field (Odum 1971:261). Undoubtedly, other successional stages of pine forest were also present along these river bottoms and terraces, reflecting yet earlier concentrations of aboriginal farming communities.

Odum's (1960) study of "old field" succession is probably a useful analog with which to model these bottomland savannas. In the initial stage of succession, the open field is colonized by forbes and grasses over a period of two years. By the third year, sedges and shrubs begin to dominate and over a period of three to 20 years, shrubs and immature trees replace the grasses and forbes. Young pine forests are established after about 25 years, and between about 75 and 100 years the

mature pine forest is replaced by hardwoods under optimal climax conditions.

Fauna of the inter-riverine uplands reflects a typical terrestrial forest assemblage. Because of greater mobility, however, the distribution of the member species can rarely be limited to a specific forest type, habitat, or even a particular ecosystem. The pine-mixed hardwood and mixed hardwood communities contain the greatest abundance and diversity of terrestrial faunal species of the upland ecosystem communities. This has been detailed most for avian species (see Johnston and Odum 1956), but it holds true for all other classes as well.

At the base of the faunal food chain is a class of animals including nematodes, arthropods, and myriapods, that spend all or most of their lives within the soil matrix of the forest (Kevan 1968). Some of the more prevalent species of soil fauna in the region are nematodes, mites, spring-tails, and earthworms. A diverse assemblage of insects is present in these forests. Some of the more common species include mosquitoes, flies, midges, wasps, bees, sawflies, grasshoppers, butterflies, moths, termites, dragonflies, mantids, crickets, cockroaches, katydids, cicadas, trips, aphids, and pine beetles (Sandifer et al. 1980:453-455). Amphibians and reptiles generally occupy moist habitats within the uplands such as leaf-litter, burrows, and temporary pools, and feed on soil fauna and insects. Numerous salamanders, hylid frogs or tree frogs, and toads dominate the amphibious fauna, while a wide array of lizards and snakes comprise the majority of the reptilian species. Turtles are rare in the upland ecosystem, and are generally represented by only the eastern box turtle in the project area. The most common lizards include the green anole, ground skink, six-lined racerunner, and the eastern five-lined skink. A group of small snakes occupies the leaf litter habitat. The eastern scarlet snake, mole king snake, brown snake, northern redbelly snake, southeast-

ern crown snake, eastern coral snake, pine woods snake, and the scarlet king snake tend to occur in this habitat in pine dominated communities. A number of larger snakes are less specific to habitat and include the southern black racer, corn snake, yellow rat snake, eastern hognose snake, southern hognose snake, eastern king snake, eastern coach-whip, and the eastern garter snake. Vipers tend to inhabit hardwood communities and the more common species of viper in the North Carolina Coastal Plain include the southern copperhead, cottonmouth water moccasin, pygmy rattlesnake, and canebrake rattlesnake.

Avian species tend to occupy very specialized niches in the forest and as such, their habitat and forest associations tend to be better defined than species of the other faunal groups. Pine forests exhibit the lowest bird densities and species diversity. Only thirteen dominant species are listed for this forest type by Sandifer et al. (1980:465) including one large predator, the screech owl, and a series of primarily insectivorous birds including the red-bellied woodpecker, eastern wood pewee, southern crested flycatcher, the Carolina chickadee, the brown-headed nuthatch, the eastern bluebird, two warblers, summer tanager, and Bachman's sparrow. The ground-feeding bobwhite and the common crow complete the list of dominants. Vultures, several species of hawk, numerous additional insectivores, and turkey comprise minor components of the avian assemblage. Thirty-two avian species are considered dominant in upland pine-mixed hardwood and mixed hardwood communities (Sandifer et al. 1980:469-470). The overall structure of this list, however, is very similar to the one produced for the pine communities. The screech owl remains the single large predator and insectivore species are the most abundant. Three species of woodpecker (i.e. pileated, red-bellied, and downy), the blue jay, the mourning dove, the Carolina chickadee, the Carolina wren, the common crow, the hermit thrush, the tufted titmouse, the robin, the

catbird, the blue-gray gnatcatcher, the cardinal, and various species of vireos, warblers, and sparrows comprise the list of dominants. Numerous additional moderately important and minor species are also listed including various hawks, vultures, owls, insectivores, and the turkey.

Dominant mammalian herbivores of the upland forests of the Coastal Plain consist of white-tailed deer, squirrels, the eastern wood rat, and the cotton mouse. The oposum and raccoon comprise the dominant omnivores, while major carnivores include the gray and red fox, the striped skunk, the short-tailed shrew, the long-tailed weasel, the bobcat, and the black bear (Sandifer et al. 1980:472-478). Pre-settlement assemblages also included cougar, gray wolf, and possibly minor numbers of elk and bison (Penny 1950). Mammalian species generally do not occupy overly specialized niches and they can range across very large areas. Deer, however, tend to aggregate in hardwood patches where browse and nut mast is more plentiful. Very few species would have occupied the pine-savanna patches on a permanent basis, but such communities would have provided an important "edge"-type feeding source for mammalian herbivores and omnivores, and also predatory avian and reptilian species hunting for rodents and lagomorphs (Odum 1960). The primary mammalian dominants of old field communities in the region today consist of the eastern cottontail, cotton rat, eastern mole, least shrew, and the striped skunk (Sandifer et al. 1980:472-473). The marsh rabbit also extends its range into such locations when feeding pressures increase in the swamps. White-tailed deer, raccoon, and oposum are nocturnal visitors to such patches to feed, and are accompanied by most of the major mammalian predators.

## PALEOENVIRONMENT

The eastern United States has undergone

rather dramatic environmental change since the beginning of human occupation in the New World, which, until recently, could only be confidently extended back to about 12,000 B.P. (see Dincauze 1984; Haynes et al. 1984; Kelly and Todd 1988; Lynch 1990; Meltzer 1989). The Meadowcroft Rockshelter investigations in Pennsylvania as well as the excavations at Cactus Hill in Virginia increase this time depth to as much as 14,000 to 16,000 B.P. (Adovasio et al. 1990) and claims of much earlier occupation during the Pleistocene glacial period are gradually gaining credibility although still discounted by many researchers (Butzer 1988). The changes that occurred during this time frame, of course, were global in scale, and were associated with the termination of the last Pleistocene glaciation, generally referred to as the Wisconsin Glaciation in North American Quaternary stratigraphy. In this section, we will examine the available evidence for paleoclimatic, paleovegetational, paleofaunal, and paleoshoreline change during the terminal Pleistocene and Holocene.

### Paleoclimate

The Wisconsin glaciation, characterized by fluctuating expansion, began about 115,000 B.P., and reached its maximum extent at 18,000 B.P. By the end of the Wisconsin, the Laurentide ice sheet of eastern North America had migrated to southern Indiana and Ohio, exerting a powerful influence on atmospheric circulation, depressing and weakening the force of summer monsoons (Gates 1976; Kutzbach et al. 1998; Webb and Kutzbach 1998). Climate was much colder and drier than today and plant species were depressed considerably south of their present ranges (Whitehead 1973). Recent palynological analysis of three wetland locations on Fort Bragg and Camp MacKall indicate that prairie-like vegetation characterized the region in the last interstadial, prior to 20,000 B.P. (Goman and Leigh 2003).

A series of environmental changes beginning around 14,000 B.P. are now well documented in the paleoenvironmental record, and provide evidence for a major climatic warming trend which eventually ushered in the Holocene, or modern, period at about 10,000 B.P. (Hare 1976). The major continental ice masses began to retreat, ocean fronts shifted poleward, the area of sea ice contracted, sea level rose, and certain middle latitude lakes became desiccated (Kutzbach 1983). The reasons for these dramatic changes are not yet well understood, but simulation models of global atmospheric circulation suggest that cyclical, long-period variation in the earth's orbital parameters may explain the alternating reoccurrence of ice ages and interglacial periods (Andrews 1973; Gates 1976; Hare 1976; Hays et al. 1976; Kutzbach 1983; Kutzbach et al. 1998; Otto-Bliesner et al. 1982). By approximately 10,000 B.P., global ice volumes reached minimum levels, the North American continental ice sheets had disappeared, most plant species had reached the poleward limits of their migrations, and modern atmospheric circulation patterns were firmly established (Kutzbach 1983; Wendland 1978).

The date of 10,000 B.P. is rather widely accepted as the beginning of the Holocene because of these factors (Davis 1976; 1983; Watts 1983; Wright 1978). The period between 14,000 B.P. and 10,000 B.P. is viewed as transitional between the Late Wisconsin Full-Glacial and the Holocene and is commonly referred to as the Late-Glacial period of the Late Wisconsin (Watts 1980a, 1983). It is inferred from sedimentation patterns and vegetation associations that the period was cooler, but also wetter, than today, while the early Holocene marks a period of warming and drying conditions (Davis 1983, Watts 1983). A rather steep gradient of warming temperatures is hypothesized for the early and middle Holocene, with maximum summer radiation peaking between 7,000 B.P. and 5,000 B.P. when temperatures averaged 2° C to 3° C higher than today. This climatic opti-



imum corresponds to the Hypsithermal or altithermal episode, which was continental in scale and possibly time-transgressive by latitude (Wright 1976). After the climatic optimum, temperatures appear to have gradually cooled, although they remained above modern levels until the Little Ice Age, dated between A. D. 1450 and A. D. 1850 (Davis 1983).

### Paleovegetation

These climatic changes had a profound effect on the biogeographic structure and composition of plant and animal communities throughout the world. In the southeastern United States, the trajectory of change moved from a Full-Glacial vegetation of pine-spruce parkland, through a wide range of mesic deciduous forest assemblages during the Late-Glacial period, and an oak-dominated deciduous forest peaking during the Hypsithermal (Davis 1983, Watts 1983). These changes were time-transgressive, with analogous shifts in assemblage composition occurring earlier at more southerly latitudes and at lower elevations.

Detailed mapping of dated pollen spectra from paleoenvironmental sites throughout the eastern United States has recently demonstrated that the poleward migration of plant species during the Late-Glacial-early Holocene warming trend was accomplished on an individual basis. Moreover, migration rates differed according to seed dispersal patterns, tolerance ranges of individual species, and the locations of refugia (Davis and Botkin 1985; Delcourt and Delcourt 1987; Webb 1987, 1988). Consequently, the modern forest types, which represent "true" Holocene climax associations, did not appear until the trajectory of climatic and environmental change had stabilized in the middle Holocene. Prior to this period the palynological record is characterized by a bewildering array of ephemeral species associations, varying along latitude and elevation gra-

dients, that have no modern analogs and are best referred to as vegetation assemblages rather than forest types or formations. The modern vegetation patterns of the Southeast, in fact, did not emerge until the Hypsithermal episode, when sea level began to stabilize and high water tables allowed the expansion of swamps and the establishment of the pine-dominated Southern Coniferous Forest along the Atlantic Coastal Plain (Watts 1980a; Webb 1987, 1988).

Principal fossil pollen sites (Figure 7) used to develop current paleovegetational reconstructions on the Atlantic Coastal Plain include: 1) Lake Annie (Watts 1975a), Mud Lake (Watts 1969), and Sheelar Lake (Watts and Stuiver 1980) in Florida, 2) Lake Louise and Pennington (Watts 1971) on the southern Georgia Coastal Plain, 3) Goshen Springs (Delcourt 1979) on the Coastal Plain of southern Alabama, 4) Quicksand, Bob Black, and Green ponds (Watts 1970) and Pigeon Marsh (Watts 1975b) in the Ridge and Valley Province of northwestern Georgia, 5) Anderson Pond (Delcourt 1979) on the Cumberland Plateau in Tennessee, 6) White Pond (Watts 1980b) on the Fall-Line in central South Carolina, 7) Single-tary Lake and Rockyhock Bay (Whitehead 1973) on the North Carolina Coastal Plain and, 9), the Dismal Swamp (Whitehead and Oaks 1979) in coastal Virginia. Added to this list is the recent palynological study of three wetland sites at Fort Bragg and Camp MacKall (Goman and Leight 2003).

The developmental history of the region can be divided into five major periods: 1) the Late Wisconsin (22,000-13,500 B.P.), 2) the Late-Glacial transition (13,500-10,000 B.P.), 3) the early Holocene (10,000-8,000 B.P.), 4) the Hypsithermal (8,000-6,000 B.P.), and 5) the late Holocene (6,000 B.P.-Present). The vegetation patterns of each of these periods will be briefly reviewed below with specific reference to the Coastal Plain of the Carolinas.

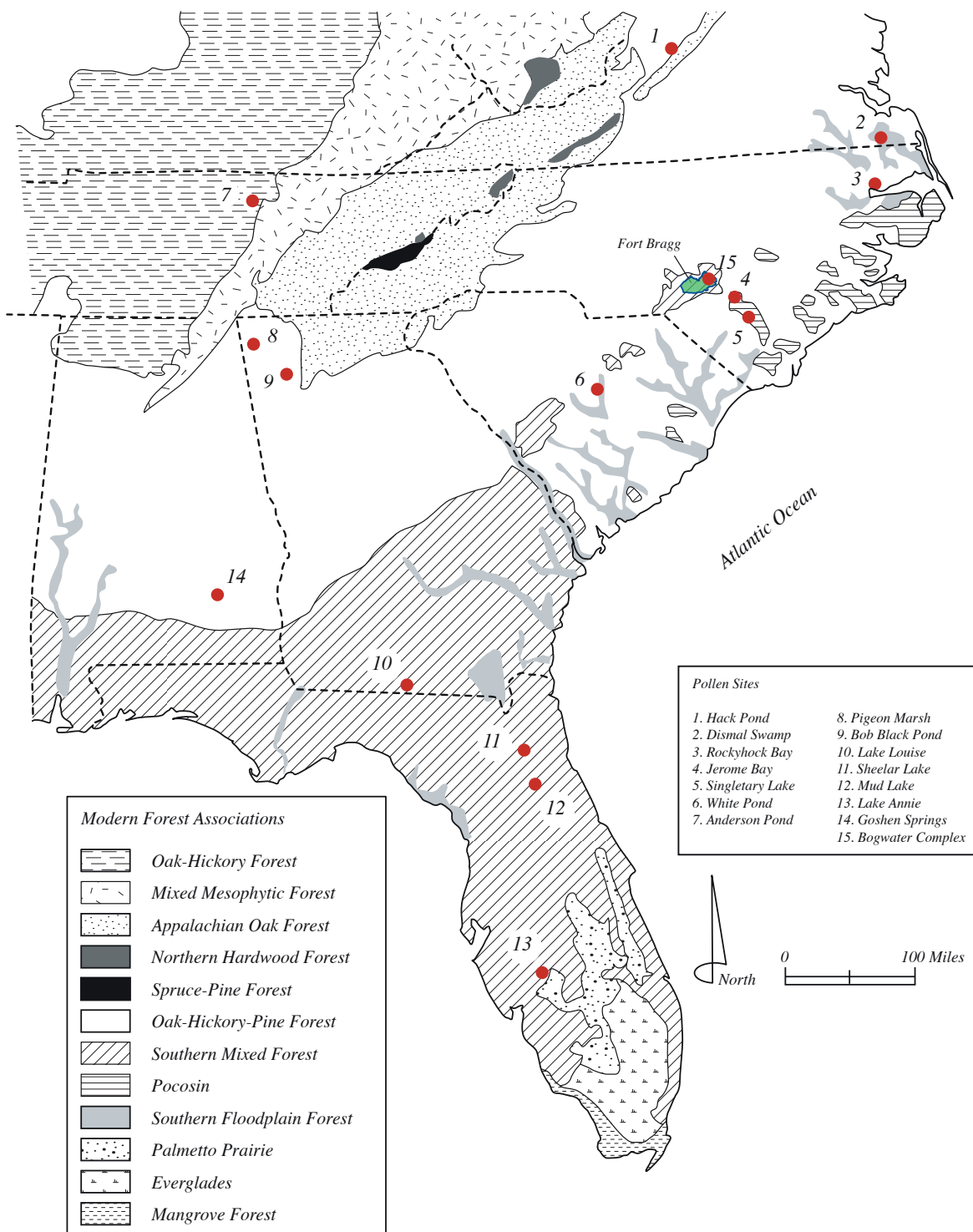


Figure 7. Location of Pollen Sites Discussed in Text Relative to Modern Vegetation Associations

*Late Wisconsin (22,000-13,500 B.P.)*

Late Wisconsin vegetation in the southeastern United States has been inferred to represent pine parkland with minor components of spruce, fir, and broad-leaved hardwoods (Watts 1980a:392-393; 1983:302-304). Pine comprises 60 to 80 percent of the pollen spectra from this period, and it has been argued that most of this pollen belongs to *Pinus banksiana* or the jack pine. Three spruce (*Picea*) species appear to have been widespread across the Atlantic Slope during this period, *P. glauca*, *P. rubens*, and *P. mariana*. In the Piedmont and Foothills of the Ridge and Valley Province, low frequencies of broad-leaved hardwoods including oak (*Quercus* sp.), ironwood (*Ostrya/Carpinus*), and hickory (*Carya* sp.) were present, while these arboreals were relatively rare on the Coastal Plain. The herbaceous dominants are principally associated with prairies today, and included wormwood (*Artemisia*), ragweed (*Ambrosia*), other composites (*Tubuliflorae*), grasses, and sedges.

Although the Late Wisconsin vegetation of the Southeast seems to have been relatively homogeneous in its composition, important altitudinal and latitudinal clines have been identified (see Watts 1980a:393, Whitehead 1973). Significant levels of spruce are documented as far south as the Tunica Hills of Louisiana (Delcourt and Delcourt 1977), but very little, if any, spruce is present in pollen spectra and macroplant samples from Florida. At Sheelar Lake in northern Florida, broad-leaved trees and herbs comprised 30 percent of the Late Wisconsin assemblage, while spruce was virtually absent (Watts and Stuiver 1980). North Carolina and Virginia, although still dominated by jack pine, were situated on the southern latitudinal transition to the spruce woodlands of the Northeast, and spectra from these states consistently show higher percentages of spruce than those from more southerly states. In addition, they contain a suite of "northern" herbaceous

species including club moss (*Lycopodium* sp.), burnet (*Sanguisorba canadensis*), and curlygrass fern (*Schizaea pusilla*). The southern limit of this transitional zone appears to have been located between Singletary Lake on the North Carolina Coastal Plain and White Pond, near Columbia, S.C. (Watts 1980a:393). The South Coastal Plain region of North Carolina would have been situated near this boundary during the Late Wisconsin and we would expect to find a transitional type vegetation assemblage.

This period represents a major hiatus of sedimentation around Fort Bragg, but evidence from the PAW2 core at the Peatland Atlantic White Cedar Forest site suggests that Late Glacial vegetation here was pine-oak woodland with riparian species such as alder locally important (Goman and Leigh 2003:52). This forest type is consistent with a climate cooler and moister than today's.

*Late-Glacial Transition (13,500-10,000 B.P.)*

Between 13,500 and 11,000 B.P. time-transgressive, but abrupt, changes occur in the pollen spectra of the Southeast (Watts 1983:305-306). These changes are reflected in increased abundances of mesic deciduous species such as hickory, beech, birch, and hemlock. The principal mechanism for these changes was the post-Wisconsin warming trend that allowed the northward migration and range expansion of broad-leaved deciduous trees from restricted refugia in various Southeastern localities.

Florida sites evidence the earliest transition. At Sheelar Lake in northern Florida, the Late-Glacial transition is dated as early as 14,600 to 14,000 B.P. with the resumption of sedimentation (Watts and Stuiver 1980). At this time the pollen spectrum of the site was still dominated by a Late-Glacial, drought-adapted woodland/prairie consisting of oak, hickory, hackberry (*Celtis*),

cedar (*Juniperus* or *Chamaecyparis*), and herbs (especially *Ambrosia*). However, by 13,500 B.P., this dry woodland had been replaced by a more mesic forest assemblage that included significant proportions of beech as well as oak and hickory. This evidently represented only a brief florescence that was soon replaced by an oak-pine forest between 13,500 and 11,200 B.P.

Vegetation transition at White Pond in the South Carolina midlands occurred somewhat later, at around 12,800 B.P. (Watts 1980a). Here, there was a seemingly abrupt replacement of jack pine and spruce forest with oak, hickory, beech, ironwood, and elm (*Ulmus*). Again, this mesic assemblage was short-lived and by 9,500 B.P., an oak-pine forest had been established across North Carolina. The transition in North Carolina began around 11,000 B.P. as evidenced by a sharp rise in oak pollen at Rockyhock Bay and Singletary Lake (Whitehead 1973). Significant proportions of hemlock, beech, birch, and ironwood also occur at this time, while the appearance of hickory is not well documented until around 9,000 B.P. The mesic forest was only weakly developed in North Carolina compared with more southerly localities, and was differentiated from the latter by “northern” species such as hemlock and birch (Watts 1980a:399).

#### *Early Holocene (10,000-8,000 B.P.)*

Between 9,000 and 10,000 B.P., the mesic forests of the Southeastern Coastal Plain were replaced by more xeric-adapted forests of oak, hickory, and pine. Broad-scale vegetation changes throughout the eastern United States indicate that conditions shifted significantly at the beginning of the Holocene, which marks the establishment of the modern climatic regime (Davis 1983:176-177). It was also during this period that the dramatic rise in post-Pleistocene sea level began to stabilize, and by about 9,000 B.P., sea level was only several meters lower than it is today

Current reconstructions suggest that both a drop in precipitation and increased temperatures ushered-in the Holocene and ultimately provided the impetus for the continued altitudinal and latitudinal migration of the mesic-adapted species northward and upward. Latitudinal and altitudinal vegetation gradients in the southeastern United States during this time consisted of three major bands. These included an oak savanna in peninsular Florida, an oak-hickory-southern pine forest along the Gulf Coastal Plain and the southern Atlantic Coastal Plain terminating in central South Carolina, and a mixed hardwood association extending across North Carolina and most of the Cumberland Plateau (Delcourt and Delcourt 1981:147-149). The higher elevations of the Appalachians still supported a refugium for the Late Wisconsin jack pine-spruce forest. Mesic hardwood species were predominantly distributed northward in a band of mixed conifer-northern hardwood associations stretching from the Mid-Atlantic states into the Mid-continent of Indiana and Illinois.

#### *The Hypsithermal (8,000-6,000 B.P.)*

The early Holocene temperature gradient increased rather dramatically until it peaked sometime between 9,000 and 5,000 B.P. By 9,000 B.P., temperatures are estimated to have been approximately equal to today, and sometime during the interval 8,000 to 6,000 B.P., it is hypothesized that temperatures were significantly higher (Davis 1983:176). This interval has been variously referred to as the altithermal, the mid-Holocene temperature maximum, and the Hypsithermal. The climatic conditions of this period are not well understood at present and there is some evidence to suggest that it was latitudinally time-transgressive. It was during this time that the oak-dominated deciduous forest of the eastern United States reached its maximum distribution, and hickory experienced a florescence (Webb 1988:402). The relatively flat latitudinal vegeta-



tion banding of the earlier periods is replaced by a decidedly northward curve along the Atlantic Slope (Delcourt and Delcourt 1981:151). By the end of this period, modern vegetation distributions were essentially established throughout the Southeast.

A decidedly new forest type, the southern pine forest, replaced the oak-hickory-southern pine forests along the Gulf Coastal Plain and the Atlantic Coastal Plain as far north as southern Virginia (Delcourt and Delcourt 1981; Watts 1979, 1983; Webb 1988). Associated with this new forest type was the expansion of swamp species such as cypress (*Taxodium*), sweet gum (*Liquidamber*), and tupelo or black gum (*Nyssa*), whose distribution had previously been confined to the Mississippi Basin and Delta. Swamping and the establishment of the southern pine forest in the Coastal Plain appear to have been brought about by the processes of sea level stabilization and accompanying stream gradient flattening. By 6,000 to 5,000 B.P. the formation of the modern swamps along the Coastal Plain was essentially completed (Brooks et al. 1989, Watts 1980a). The issues surrounding the true climax vegetation of the Southeastern Coastal Plain have been reviewed earlier in this chapter (see also Quarterman and Keever 1962). Regardless of the controversy, it is a fact that pollen profiles throughout this region document a significant increase in southern pine during the Hypsithermal, and it would appear that changes in water table conditions resulted in a significant representation of "post-climax" conditions which would have inhibited a homogeneous development of the oak-hickory-southern pine association. Delcourt and Delcourt (1981:150) contend that the oak-hickory-southern pine association existed as a true climax vegetation type only along the Piedmont of the Atlantic Slope and the Ozark Highlands.

### *Late Holocene (6,000 B.P.- Present)*

Very little broad-scale change has occurred in vegetation and ecological distributions in the Southeast since about 6,000 B.P. Delcourt and Delcourt's (1981) paleovegetation maps of 5,000 B.P. and 200 B.P., in fact, are virtually identical. The most significant changes to occur during this time interval were the continued development of swampy freshwater wetlands on the Coastal Plain with the resumption of somewhat moister climatic conditions and the development and expansion of estuarine and salt marsh habitats along the coast.

The initial development of estuaries is dated by archeological inference to around 4200 B.P. along the South Carolina coast (Brooks et al. 1989:93-94). It is evident that the most dramatic impact of these trends was experienced along the sea island region of Georgia and South Carolina and the Outer Banks region of North Carolina where the complex geological structure of the submergent coastline provided conditions most favorable to the development of estuarine and marshland ecosystems. The same effects were not so strongly felt along the South Coastal Region of North Carolina, where the more homogeneous strand structure predominated. Nevertheless, significant prehistoric and ethnohistoric utilization of estuarine resources has been documented along the North Carolina coast as well (see Phelps 1983).

In the surrounding area of Fort Bragg, vegetation assemblages appear to have achieved a "modern" composition. Oak-pine forests predominated and *Pinus palustris* became the dominant upper story species (Goman and Leigh 2003:54). Sedimentation resumed across the region at about 6,000 B.P.

### Paleofauna

The dramatic changes that occurred during

the Late-Glacial transition were accompanied by major animal extinctions, the most obvious of which involved the large mammal component of the Late Pleistocene Rancholabrean faunal assemblage (Voorhies 1974:85). At least thirty-three different genera of large mammals from this assemblage did not survive the transition, including the equids, camelids, and the Proboscidea (Grayson 1987, Martin 1984:361-363, Meltzer and Mead 1985). The issue of whether these extinctions were totally independent of human predation has never been sufficiently resolved (see Martin and Klein 1984), but the coincidence of widespread human colonization of the New World at this time does suggest at least a contributory role for Paleoindian populations. It is at times easy to ignore the fact that Late Pleistocene faunal assemblages also contained most of the smaller, less-glamorous species that inhabit this region today. Semken (1983:192) describes the Late Pleistocene fauna of the United States as consisting of a combination of components including extinct megavertebrates, extant mega- and microvertebrates of temperate regions, and now disjunct large and small northern species. Modern faunal assemblages, therefore, are often considered to represent an “impoverished residuum” of the diverse and dense Late Pleistocene Rancholabrean assemblage (Martin 1967; Martin and Webb 1974; Semken 1974, 1983).

Webb (1981) distinguishes three late Pleistocene faunal zones in the Southeast (see also Goodyear et al. 1989:22): 1) a subtropical zone covering Florida and southern Georgia, 2) a temperate zone extending northward into the central South Carolina area, and 3) a boreal zone extending from central South Carolina through North Carolina and up into the Mid-Atlantic region. The locations of these zones conform well to the Late Wisconsin and Late-Glacial transition vegetation bands previously discussed. The subtropical faunal zone correlates with the scrub oak dune prairie of peninsular Florida, the temperate zone

corresponds to the oak-hickory-southern pine forests/savanna of the Gulf Coast and the southern Atlantic Slope, and the boreal zone extends from the central South Carolina ecotone of mixed conifer and northern mesic hardwoods northward into the jack pine-spruce parkland of North Carolina and the Mid-Atlantic.

The subtropical assemblage consisted of species adapted to a warm, moist, and relatively equable climate such as the giant tortoise (*Geochelone crassiscutta*), deer (*Oedicleus virginianus*), glyptodonts, giant ground sloth, the American mastodon (*Mammuth americanum*), tapir, peccary, giant beaver, capybaras, alligator, and turtles. Species of the narrow temperate zone consisted of the Columbian and woolly mammoths (*Mammuthus columbi* and *M. primigenius*), bison (*Bison*), horse (*Equus*), camelids (*Camelops* and *Hemiauchenia*), the American mastodon, and deer. The boreal zone fauna was represented by the woolly mammoth, caribou (*Rangifer tarandus*), horse, and bison. The ranges of the Rancholabrean megafauna, of course, cross-cut the zones of demarcation, and Webb (1981) has argued that the temperate zone may have exhibited the greatest species diversity owing to its transitional or ecotonal position. Again, the Strand zone would have occupied a transitional position between the northern boreal assemblage and the temperate zone assemblage.

There is definitive evidence to determine that the earliest well-known human populations in North America, identified as Paleoindian, did exploit the Rancholabrean megafauna. This evidence is primarily derived from the western United States, but several examples have been documented from the eastern United States as well, including the Kimmswick mastodon in Missouri (Graham et al. 1981), the butchered giant tortoise carcass from Little Salt Spring, Florida (Clausen et al. 1979), the *Bison antiquus* skull with a fragment of a chert projectile point embed-

ded in it from the Wacissa River Valley, north Florida (Webb et al. 1984), and the worked proboscidean bone from sink holes in north Florida (Dunbar et al. 1974.). A review of radiocarbon dated assemblages, however, indicates that Paleoindian exploitation of megafauna in North America was probably limited to a period of less than 1,000 years (Meltzer and Mead 1985), and that the major peak of extinctions occurred between 11,500 and 11,000 B.P. Haynes et al. (1984) cogently argue that only the very earliest Paleoindian groups (i.e. Clovis), in fact, exploited these large animals prior to their extinction. Current evidence indicates that the post-Pleistocene mass extinctions were virtually complete as early as 10,800 to 10,000 B.P., and that only modern faunal assemblages can be found after this time range (Goodyear et al. 1989:25).

#### Paleoshorelines

A final factor of importance in evaluating Late Glacial and Holocene paleoenvironments is sea level fluctuations. It has been known for some time that sea levels have changed many times over the history of the earth and it has been determined that these changes are related to a number of complexly interrelated factors. The five basic determining factors include: 1) tectonic changes or movements in the earth's crust, 2) glacial isostasy or rebound, 3) hydro-isostasy or rebound, 4) geoidal changes, and 5) glacio-eustatic movements due to alternating processes of glaciation and deglaciation (Bowen 1978:158). During the last glaciation sea levels on the eastern North American coastline varied between 90 and as much as 130 meters below present sea levels, which resulted in exposing most, if not all, of the continental shelf to terrestrial life forms. The Late Glacial and Holocene sea level rise is attributable primarily to processes associated with deglaciation.

We know from studies in the southeast (see Colquhoun and Brooks 1986) that sea level did not attain dynamic equilibrium until about 4,000 years ago. Prior to this, sea levels were generally greater than 2 or 3 meters lower than today. At 8,000 years ago, sea levels are estimated to have been at approximately 8 meters below present levels and a rather steep rise in sea level is documented from the beginning of the Late Glacial until more stable conditions were established at around 6,000 years ago. This, of course, resulted in a rapid inundation of the continental shelf and the destruction of established estuarine fisheries and shellfish habitats, which were not established again until around 4,000 B.P.

During the Early Holocene and Late Glacial periods lake sediments indicate that the Coastal Plain was more xeric than today and was essentially devoid of major swamp wetlands (Brooks et. al. 1989:91-92) due to lowered sea levels. Evidence exists, however, for increased precipitation during the Holocene in the form of organically rich clays dating to this period in Dismal and Okefenokee swamps. Conditions became drier in the Hypsithermal and the general xeric nature of the Coastal Plain did not change significantly until about 5,000 years ago. At this time, extensive peat deposits are detected throughout the Coastal Plain and it is inferred that this indicates the initiation of major swamp forming conditions. During this period, sea level rose to within several meters of present day levels and it is argued that the two processes were linked through a concomitant rise in freshwater hydrologic levels.

Clearly, then, prior to sea level stabilization at about 5,000 to 4,000 years ago, the Coastal Plain was a relatively xeric environment generally devoid of the extensive swamp and bay formations we see throughout the area today. Adaptation was geared to the hunting and collecting of terrestrial fauna and flora tethered to creek beds, Carolina bays, and river valleys. At about 4200

B.P., however, we begin to see evidence for intensive shell collecting and marine and freshwater fauna exploitation in the newly formed estuaries, and major interior settlement around swamp wetlands. This period corresponded with the emergence of the ceramic Late Archaic cultures of the major river valleys and coast.

# Chapter 3. Research Design

Our primary approach to conducting Phase II investigations at Fort Bragg is to build a database that allows the evaluation of the occupation histories of individual sites within the framework of regional settlement analysis. The research design and methodology employed in the conduct of fieldwork and analysis on this project is presented in this chapter.

## APPROACH TO RESEARCH

In general, regional research designs incorporate procedures for three levels of archaeological investigation (Redman 1973:64). These include surveys (reconnaissance and intensive), testing projects, and full-blown excavations. The current project may seem somewhat poorly adapted to this scheme since the primary data collection will consist exclusively of test excavations. If the work is to be integrated into a larger management program, however, it is necessary to develop linkages to surveys on the one hand and excavations on the other. This is particularly crucial when the overwhelming majority of the site evaluations will be made in relation to criterion d of the National Register of Historic Places (36CFR60.4), which is concerned with the scientific value of properties.

Because of the complexities and broad scope of most scientific inquiries, probability sampling has come to represent a necessary step in deriving an adequate view of the phenomena under study. Sampling at this scale requires a rigorously controlled design to insure that the targeted variability is captured and described. In the case of regional archaeological approaches, this variability is manifest in two major dimensions, environmental zones and site types. Without an accurate picture of these dimensional associations, it is not possible to adequately assess the role(s) of a particular site within the larger regional system. Nor is it possible to systematically determine if a particular site contains information that is redundant in relation to the existing corpus of eligible sites. The survey data from the Fort, because of their broad geographic range and large sample size, are the basis for identifying the critical dimensional relationships between site type and environmental zone.

A site typology, however, must be built and developed in accordance with the kinds of theoretical goals that are selected to guide research. As stated above, we propose to describe and elucidate the regional organization of each of the cultural systems registered in the archaeological record of the Fort and to address issues concerning dia-



chronic change. The themes of historic context identified and developed specifically in Appendix XI of the Integrated Cultural Resource Management Plan (2001) constitute the subject matter for the investigation. Since these organizational themes are principally concerned with adaptations to the environment by cultural systems, the site typology should be constructed to reflect function and mobility strategies. In addition, because sites are merely the locations of behaviors that may have changed over time, the typology must also be organized at the sub-site level to reflect occupation component patterns. Once this information is synthesized into a regional model of diachronic land use, sites to be tested under the current contract can be successfully evaluated within the context of a regional database. Models of component function and mobility can be investigated and refined through greater excavation coverage on sites selected for testing. These results, in turn, can provide clear directions for data recovery operations. Over the course of the contract, field techniques and analytical procedures will be adjusted as feedback is integrated into the historical and cultural contexts of the Fort.

### Concept of Occupation Clusters

Archaeologists have traditionally viewed the site as the primary unit of analysis in settlement pattern studies. This is unfortunate because, in reflection, the site is not the unit that we need to isolate when undertaking settlement reconstruction. In the most general way, we want to observe the relationship between discrete occupations, defined as the uninterrupted use of a place by participants in a cultural system (see Binford 1982:5), and the features of the landscape. Sites, on the other hand, are places in the landscape that have served as the stage for any number of occupations, usually by a long sequence of cultural systems. Consequently, sites are agglomerations of occupations that can serve to obscure and con-

found our understanding of how individual cultural systems operated if they are allowed to serve as the primary analytical unit. This is not to say that we naively equate occupations with sites, but our measures of occupation variability tend to be made at the site level and consequently they are unspecific and at times misleading.

Clearly, there are difficult methodological problems posed when attempting to isolate occupations within sites as Dunnell (1971:150-153) has observed, particularly when we attempt to break down deposits into assemblages. Moreover, whole-site approaches have been devised that provide some basis for observing long-term land-use patterns (see Binford 1982). However, these approaches lean heavily on synchronicity concepts such as site function (i.e. field camps, residences, special use areas, etc.) and component in their construction. In monotonous situations where function shifts little with reoccupation, site level characterization can be useful, but in dynamic, multi-component situations, cultural and chronological relationships are obscured.

The “occupation cluster” concept is used to organize component characterization in the Fort Bragg database. The concept has been used successfully in South Carolina (see Cable et al. 1994: 69-74 and 153-170; Cliff and Cable 1999: 413-433) and its application provides a basis for systematically unpacking sites to isolate component structures with survey and testing data. The occupation cluster represents a discrete concentration of diagnostic artifacts of a particular culture historic phase or period. A single component may be comprised of any number of occupation clusters and these clusters can represent functional, temporal, and/or organizational variability within the component. Moreover, a single occupation cluster may contain temporally offset or overlapping occupations of a single component. Thus, an occupational cluster is an empirically defined spatial unit and does not necessarily represent a

discrete, synchronous deposit. It is doubtful that the temporal relationships of occupation clusters comprising a single component can be defined in a satisfactory manner with survey or testing data. However, a question such as this might achieve extreme relevance in organizing a data recovery program. For instance, a series of small clusters might represent re-occupations by single-family or specially comprised task groups or alternatively they might be ultra-contemporaneous members of a multi-family residence.

The extant methodology for defining occupation clusters has involved the generation of functionally and/or chronologically sensitive diagnostic artifact density maps from shovel test grids. The accuracy and specificity of the component models produced from this procedure vary with the size of the sampling interval and the types of occupation clusters present. Large, dense clusters are defined with relative ease and with a great degree of confidence.

An example of a large component comprised of a series of linked, functionally differentiated occupation clusters is provided by the Salt Pond Plantation historic component (Cable et al. 1994:86-94). Salt Pond Plantation was a small eighteenth century, satellite plantation owned and operated by Nathaniel Johnson, whose principal residence was Silk Hope Plantation on the Cooper River north of Charleston, SC. Historic records indicate that the plantation was permanently inhabited by an overseer and a small number of African slaves. In addition, two wood frame houses were known to exist on the property, one used by the overseer and the other used by the Johnson family and guests when visiting the plantation. A 20 m interval shovel test grid was placed over the presumptive location of the plantation and a peculiar H-shaped pattern of late eighteenth century artifacts measuring about 200 x 275 m was identified by density contour mapping (Figure 38). Subsequent mapping of various

functional artifact categories revealed discrete occupation clusters within the component corresponding to two structures, an outdoor kitchen area and a slave row. The residential zone of the plantation also contained extensive prehistoric occupation (Figure 9). Most of the ceramic material could be associated with the Mississippian period. Nine Mississippian ceramic clusters were defined, four of which were large and appeared to form a circle around a central zone of low artifact density. The physical characteristics of this four-cluster aggregation suggested a compact village, perhaps with an encircling palisade wall and central plaza.

Shorter interval testing at Salt Pond would undoubtedly have provided a more accurate definition of the occupation clusters associated with each of the components, and probably would have resulted in the identification of additional small clusters across the site. At every stage of archaeological investigation, we are confronted with problems of sampling and projecting population estimates from the partial data we recover. Statistical methods based on Monte Carlo resampling simulations exist which provide a basis for making such estimates from sampling results (Blank, Seiter, and Bruce 2001; Simon 1997; for an archaeological application see Cable and Donaldson 1988).

The ability to generate population estimates of small occupation clusters from shovel test samples is a crucial step in implementing the methodology developed here. This is especially true for locations such as Fort Bragg, where the majority of clusters are small and the sampling interval is not close enough to guarantee full identification. Our experience in working on heavily reoccupied prehistoric sites comprised primarily of small occupation clusters in sandy substrates is that a fairly close correspondence between testing results and excavated occupation clusters is achieved at a shovel test grid interval of 5 m (see





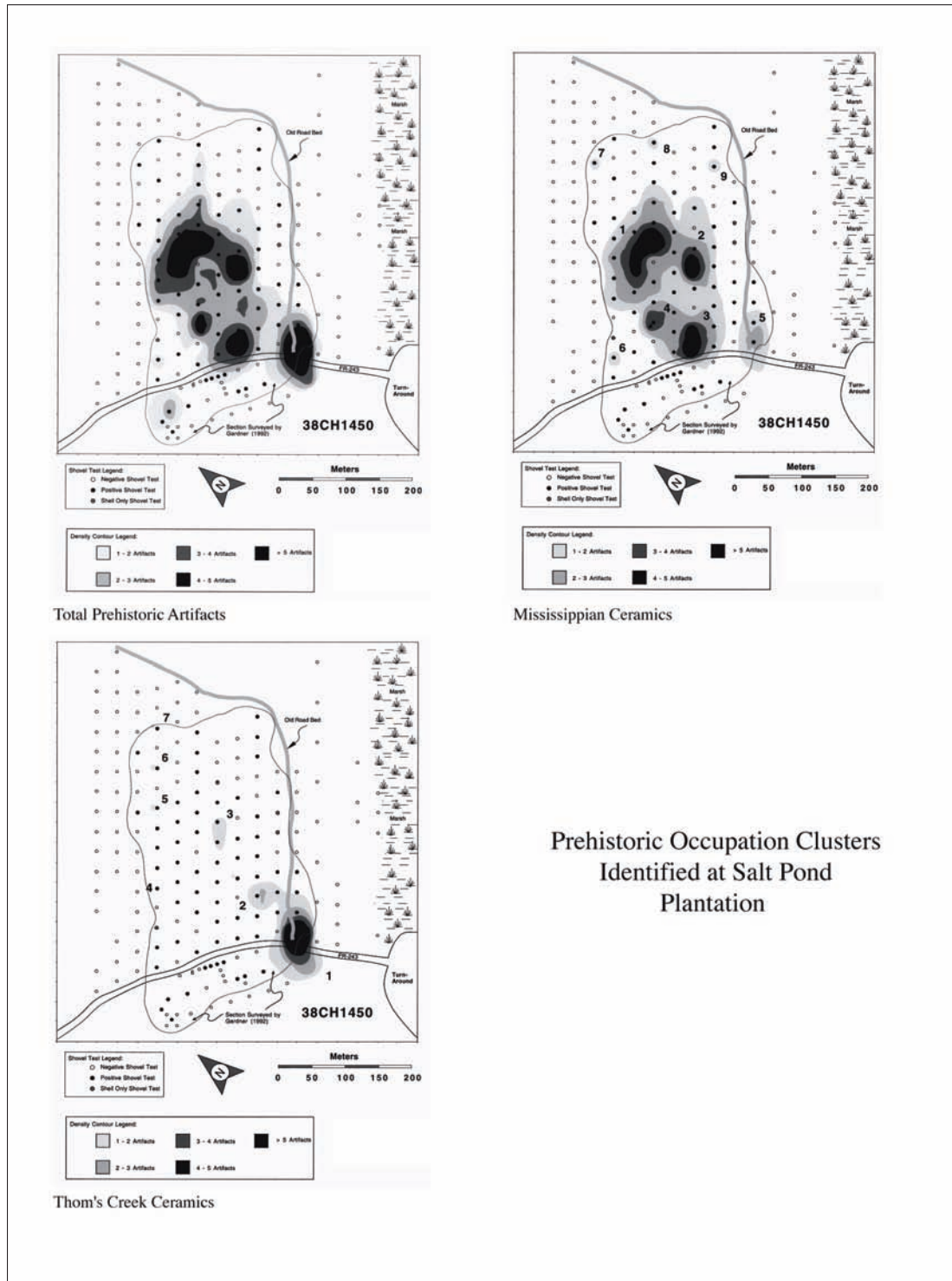


Figure 9. Prehistoric Occupation Clusters at Salt Pond Plantation, Francis Marion NF, SC

Cable and Cantley 1998; Cantley and Cable 2002; Cable et al. 1998).

However, individual hunter-gatherer occupations along the Atlantic Slope generally range from 2 to 5 m in diameter, and under these conditions 5 m interval shovel testing cannot provide a very effective basis for developing site functional models. Much closer intervals would be required to adequately sample individual occupations. As a heuristic, consider the dimensional characteristics of !Kung bushmen camps as described by Yellen (1977), which are quite close to those found along the Atlantic Slope. Figure 10 displays a redrafted plan of a two household bushman residential camp known as Tanagaba. Two families slept and conducted most of their camp activities within a 5 m diameter area. Not all of this area would be archaeologically visible. The primary artifact deposits associated with the camp occurred between the hut entrances and the adjacent hearths and encompassed debris scatters measuring less than 2.5 m in diameter each. Even if the occupations at Fort Bragg are not functionally equivalent to this bushman campsite, they are structurally and dimensionally very similar.

Now consider how a palimpsest scatter of such occupations across a ridge top would relate to shovel test grids of different sizes (Figure 11). At a 10 m interval, none of the positive tests would link a common occupation. Contouring at this extremely coarse-grained level combines unrelated information into a single algorithmic distribution and creates misleading and incomplete density maps. The problem is compounded by artifact recovery success. Just because you are excavating in the area of a former camp does not mean you will recover anything from it. On the other hand, you might have been fortunate to come down on the center of the debris scatter near a hearth and thusly conclude that this might be a good place to put in a test unit. Had the grid been shifted a meter in any direction, however,

the return may have been singularly unimpressive and your attentions might be shifted elsewhere. Only two of 30 hearths in the hypothetical site would have been intercepted or nearly intercepted by 10 m interval shovel testing. Testing at 5 m intervals would increase the coherence of the distributional sample significantly, as an increased number of adjacent tests would potentially yield artifacts from the same occupation. However, if most of the occupations consisted of single-family units with an average diameter of 3 m, none of the tests would have produced related materials, even at this relatively high sampling intensity. Finally, at an intensity of 2.5 m an accurate map of debris concentrations could be achieved, and there would be enough negative tests between occupations or reoccupation clusters to identify the rough boundaries of the phenomena of interest. Intervals below 2.5 m intervals would be required to sample individual occupations, however.

Another methodological problem that is encountered at Fort Bragg is the recognition and identification of Archaic occupation clusters. Projectile points are rarely recovered from shovel tests and this is the primary diagnostic artifact used to identify Archaic phases. However, there is ample evidence that lithic material found at depths below 30 or 40 cm in sandy matrices along the Atlantic Slope is affiliated with Archaic and Paleoindian phases. Michie (1990) observed, over a large sample of South Carolina Coastal Plain sites, that Archaic and Paleoindian components consistently derived from depths of 30 to 70 cm below ground surface. Moreover, the phases were positioned in a vertically coherent pattern relative to one another. Late Archaic material was consistently found between 28 and 35 cm, Middle Archaic assemblages occurred between 35 and 55 cm, Early Archaic components were positioned between 50 and 60 cm, and Paleoindian materials were located below 60 cm. Today we know that these depth ranges vary from one depositional environment to the next (see Brooks

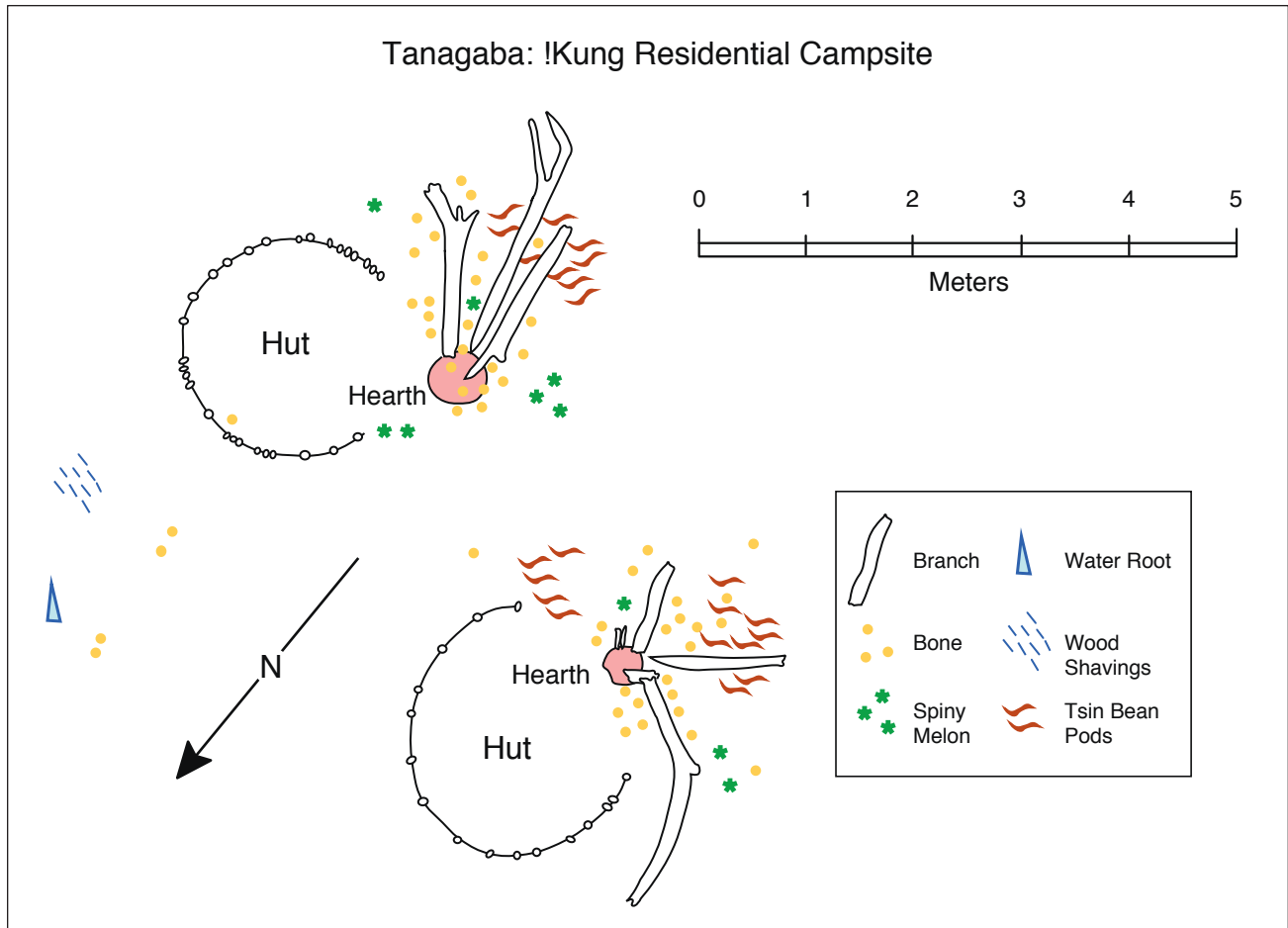


Figure 10. Structure of Two-household !Kung Residential Camp (from Yellen 1977)

et al. 1998), but the relative vertical positions of the components are always expressed in a coherent sequence.

Woodland and Mississippian materials, by contrast, are concentrated in the upper 30 cm of deposit. A graphic demonstration of the Woodland (ceramic)/Archaic vertical dichotomy is provided by the density distributions of ceramics and lithics by level from shovel test sampling at Site 38SU136/137 on Poinsett Range in Sumter County, South Carolina (Cantley and Cable 2002). Here shovel tests were excavated in two levels, 0-30 cm (Level 1) and below 30 cm (Level 2) on a grid of 10 meters with a subsample of 5

meter interval frames (Figure 12). Ceramics were clearly concentrated in Level 1 (Figure 13), while a majority of the lithic material was positioned in Level 2 (Figure 13). Although Woodland occupations also contained lithics, Archaic occupations, as confirmed by block excavations, contained higher lithic densities. Clearly, level excavation of shovel tests provides a basis to identify pre-ceramic occupation clusters in sites with sandy matrices, and a tripartite level division would increase the capability of distinguishing between later Archaic occupations and earlier ones. As a starting point we excavated shovel tests in the following arbitrary levels: 1) 0-30 cm, 2) 30-55 cm, and 3) > 55 cm.

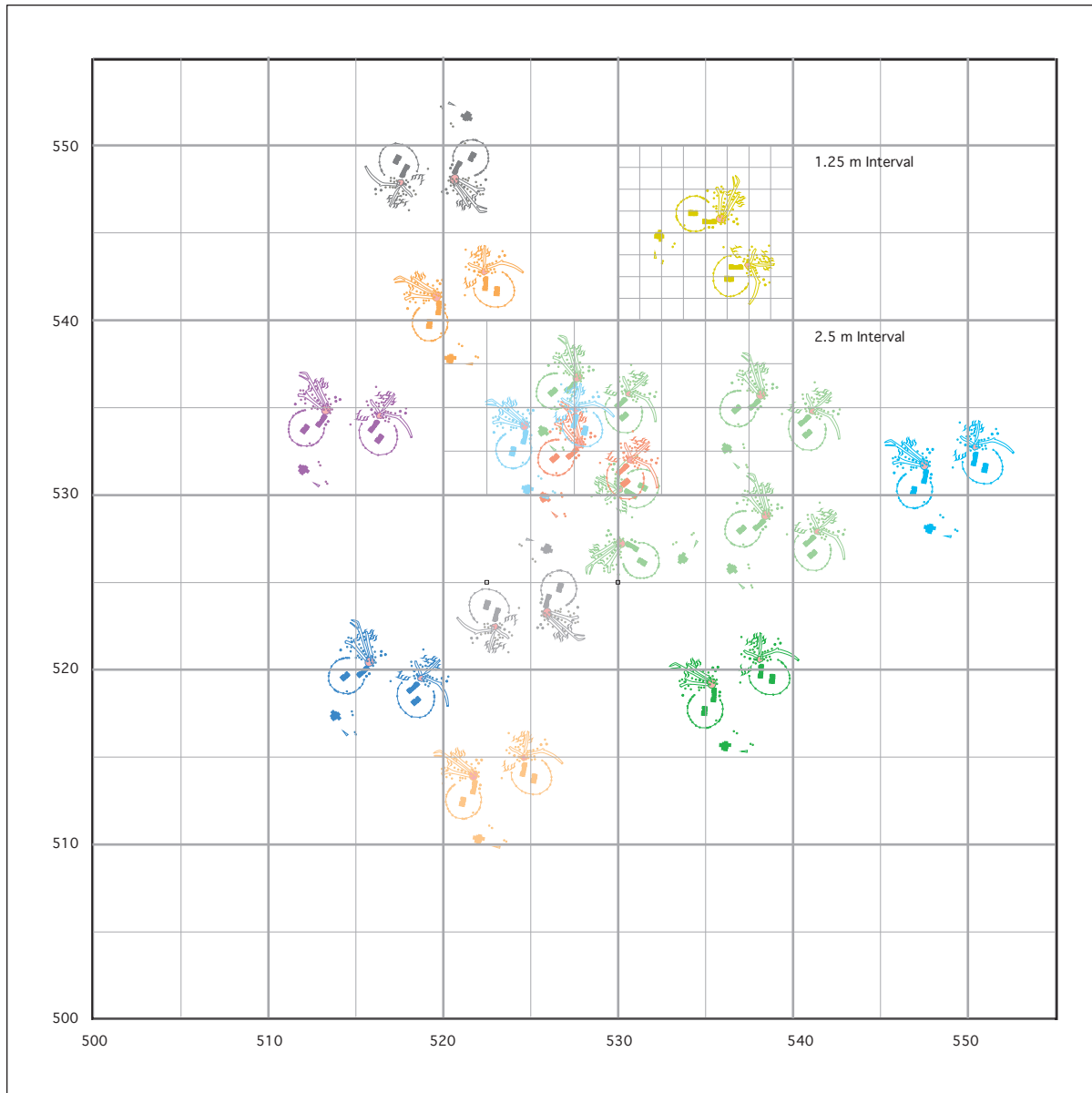


Figure 11. Simulated reoccupations of Tanagaba-like settlements (different colors represent separate occupations) over shovel test grids of varying intervals

In addition to vertical excavation, another factor or principal can provide guidance in distinguishing clusters made up of lithics. Our experience in the South Carolina Coastal Plain (see Cantley and Cable 2002:266-267) indicates that occupation floors tend to be comprised of a limited range of lithic raw material types. Most commonly, a single raw material type comprises

an entire concentration. This holds true for both debitage and tools. Low lithic raw material diversity would seem to be a consistent feature of short duration campsites, particularly when raw material sources are not available in the immediate vicinity. This would appear to be the case at Fort Bragg as well (see Benson 1999:25-34; Daniel and Butler 1996). In these situations, raw mate-



rial cores are imported to a campsite and reduced to manufacture and replenish tool kits. In situations where occupation duration does not exceed several days there is little opportunity to reduce a variety of cores from different sources. The consistent occurrence of spatially segregate debitage concentrations of single lithic raw material types provides an important organizing principle for identifying occupation clusters. Benson's (2000:622) observations concerning prehistoric sites tested in the Overhills Tract indicate that raw material segregation commonly occurs in the Fort Bragg area, as would be predicted given short occupation spans and extralocal raw material sources. This principal should not be applied uncritically, however, as there are a number of situations that could bring different raw material types together in the output of a single occupation. For instance, long curated tools and cores made of different raw materials might find their way to

a campsite where they were reduced or used and deposited along with the dominant byproducts of cores from the last source visited. Another example would involve the rendezvoused aggregation of multiple households traveling from different locations and carrying lithic raw material from different sources. Individual concentrations in this instance, however, might retain raw material homogeneity. Acknowledging these limitations, however, lithic raw material segregation can be effective in tentatively distinguishing overlapping lithic concentrations in both Archaic and Woodland contexts. Moreover, in Woodland contexts lithic and ceramic concentrations are spatially discrete and represent functionally distinct occupation clusters (see Cable et al. 1998).

In combination with tripartite level excavation of shovel tests, the raw material segregation principal provides a basis for generating

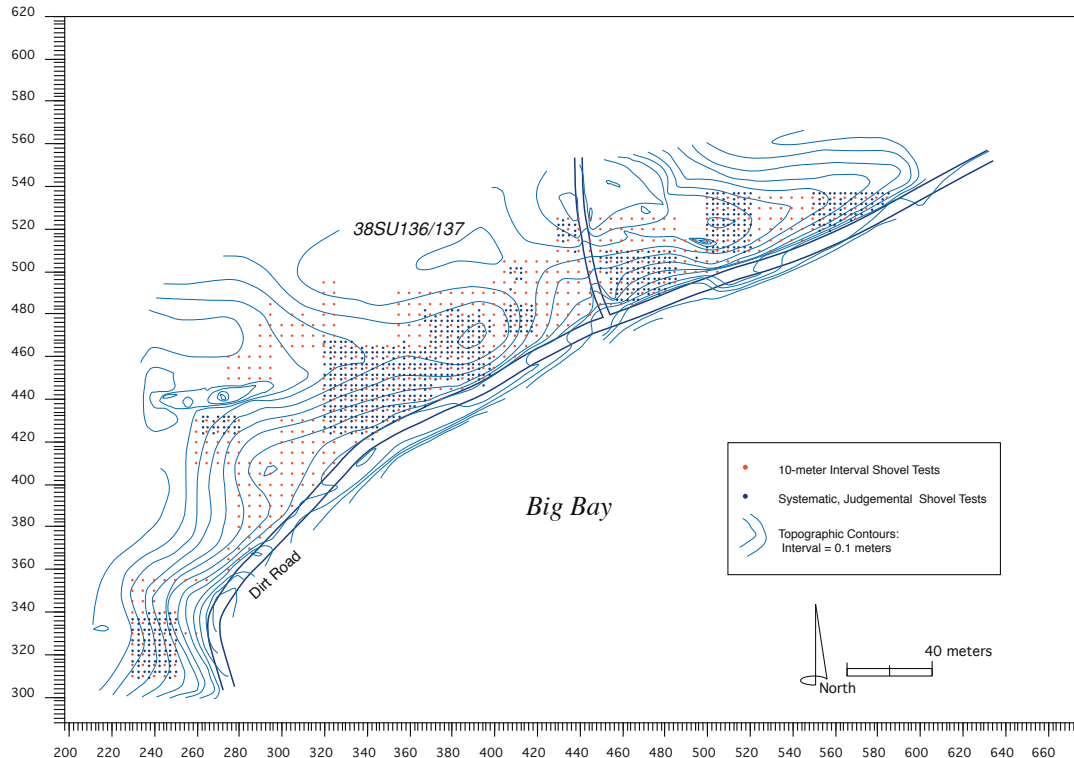


Figure 12. Shovel Test Pattern, 38SU136/137, Poinsett Range, South Carolina

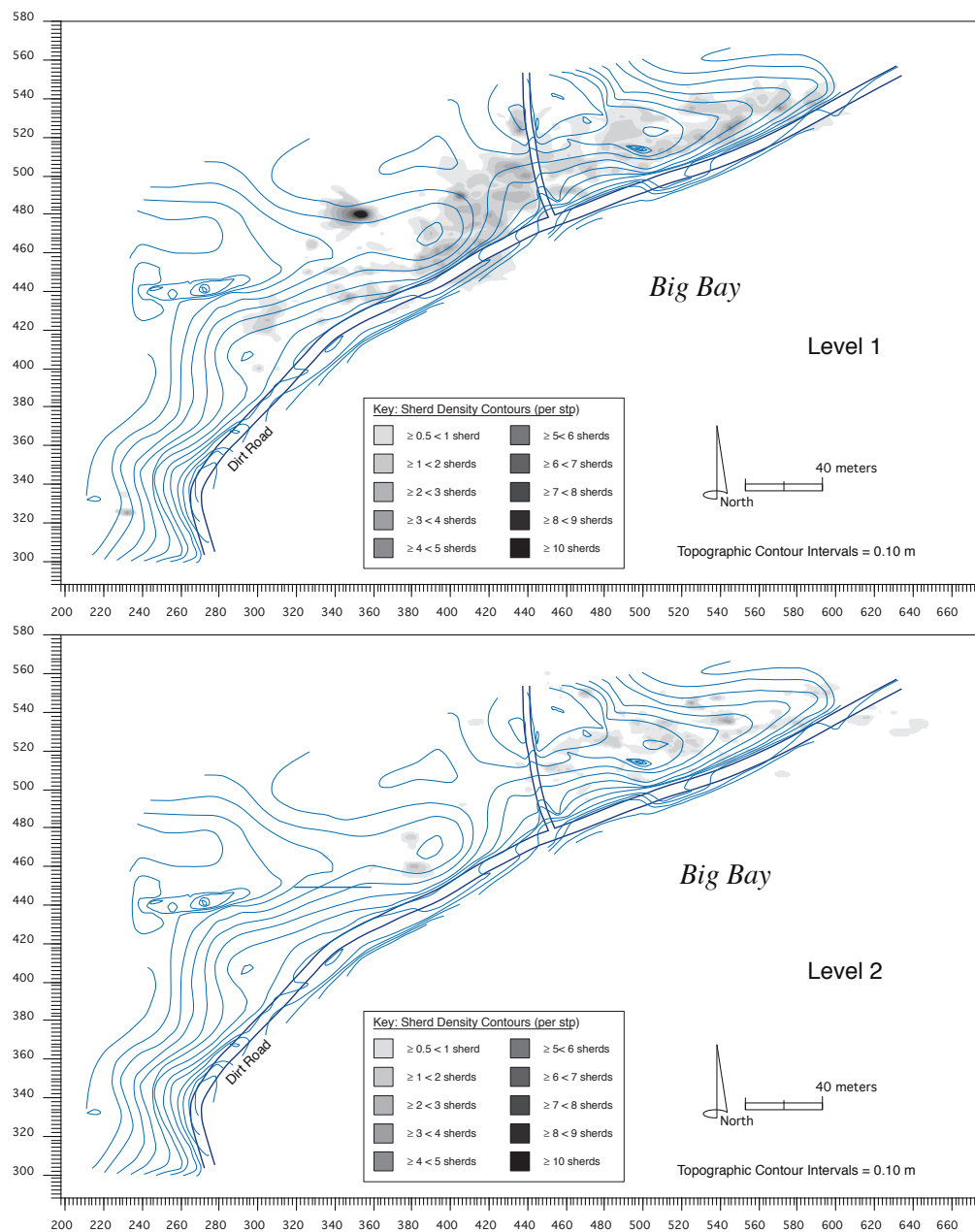


Figure 13. Vertical Density Distributions of Prehistoric Sherds and Lithics, 38SU136/137

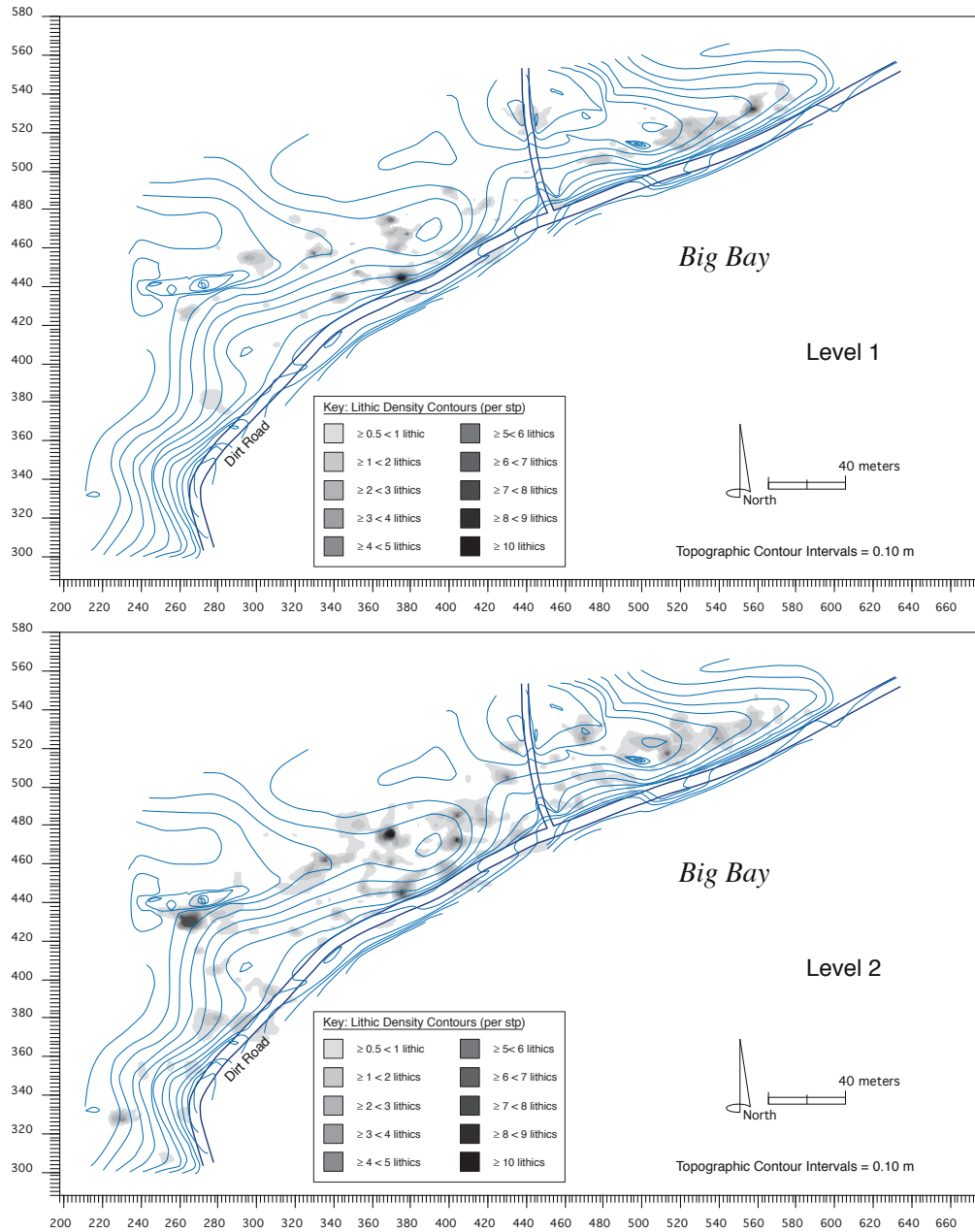


Figure 13. Vertical Density Distributions of Prehistoric Sherds and Lithics, 38SU136/137

identifications of lithic clusters with culture-chronological implications. For instance, a cluster composed of porphyritic rhyolite recovered from Level 2 would suggest a Late or Middle Archaic affiliation. Over a large sample of clusters, then, it might be possible to begin to construct chronological raw material utilization patterns based on debitage outputs to complement and contrast patterns derived from diagnostic projectile points.

### Cluster Measures

Various characteristics of occupation clusters can inform on the organization of regional systems. Our ability to accurately measure these characteristics, however, depends on the number of sample points (i.e. shovel tests) that define a cluster. Obviously, an occupation cluster represented by a single shovel test is subject to a high degree of stochastic variation. Larger clusters represented by a number of sample points, or smaller clusters more intensively sampled, on the other hand, will yield more reliable measurements, simply because they contain larger sample sizes. In this regard, survey data will less reliably characterize the quantitative properties of occupation clusters than data derived from testing projects as a rule.

The two characteristics that have exhibited the most utility for settlement pattern studies are Cluster Size and Cluster Artifact Density (Cable et al. 1994; Cliff and Cable 1999). Another characteristic that may have selective value in comparing the internal structure of larger cluster types is Cluster Spatial Point Pattern. Although procedures for measuring these variables were provided in the initial research design, on-the-ground applications of more intensive shovel test sampling strategies required some modifications that will be discussed below.

### Cluster Size

Our original plan was to use the Delaunay triangulation algorithm to define cluster size. This method is not as sophisticated as grid model techniques, but it more faithfully honors the actual sample point values and also approximates more closely hand drawn contours so that computer mapping is not essential to achieve data comparability. Moreover, the method could be used to approximate cluster sizes from small numbers of positive shovel tests. During fieldwork, however, it became clear that we would have a difficult time identifying clusters at relatively large shovel test intervals due to the paucity of diagnostics. When shovel test intervals were lowered to sample restricted areas we achieved a degree of success in defining individual clusters by raw material distributions, the identification of tool clusters, and occasionally the recovery diagnostic artifacts. This dictated that we focus on a smaller number of clusters than originally estimated and sample each more intensively. Consequently, we shifted to a grid-based contouring algorithm to estimate cluster size, which is more accurate when larger sample sizes are available. Clusters were defined at shovel test intervals of 2.5 m and 1.25 m, resulting in samples of as many as 6 to 16 shovel tests within a single cluster.

### Cluster Artifact Density

Artifact density for each occupation cluster was calculated as a weighted mean of artifact frequencies recovered from shovel tests, standardized by unit area. A weighted mean is preferable to the common arithmetic mean because it helps control for sampling error related to non-homogeneous data distributions. The weighted mean measurement applied here is described by Long and Rippetaeu (1974:208) and is calculated by constructing a frequency histogram of diagnostic artifact frequencies by shovel test. Factoring is applied to progressively give greater weight to the



more frequent shovel test results. For example, an occupation cluster comprised of eight shovel test results, two of which produced no artifacts, three of which yielded one artifact each, two of which contained two artifacts each, and one of which produced five artifacts associated with the specific cluster would yield a weighted mean of 1.0 artifacts per shovel test. Respective weighting factors for these four frequency groups following Long and Rippeteau (1974:208) would be:

Result	Artifact Frequency	Weighting Factor
0	2	2.5
1	3	4
2	2	2.5
5	1	1

Each result is assigned a weighting factor from 1 to 4 based on its frequency of occurrence ranking. In the example above a weight factor of 2.5 was assigned to results 0 and 2 because they have equal frequencies (n=2) of occurrence. The average of ranks 2 and 3, the positions they occupy, is 2.5. The weighted mean would then be calculated using this general formula:

$$\frac{(r_1 \times w_1) + (r_2 \times w_2) + \dots (r_n \times w_n)}{w_1 + w_2 + \dots w_n}$$

Where r equals the individual shovel test result and w equals the weighting factor associated with each shovel test result. Each separate result is multiplied by its assigned weight factor and the sum of these weighted results is divided by the sum of the weights for each shovel test as opposed to the actual number of shovel tests (n), which would represent the denominator in the standard arithmetic mean. The unweighted arithmetic mean for these data would equal 1.5, but the weighted mean is lower (1.0) and compensates for the potential bias posed by the one unusually high yield shovel test.

It is also desirable to standardize mean density so that area densities can be easily calculated and compared. A standardized area of 1 m<sup>2</sup> is an easily compared value. The mean calculated above indicates a density of 1.00 artifacts per 30 cm square shovel test, an area of 0.09 m<sup>2</sup>. This yields a mean density of 11.11 artifacts per m<sup>2</sup> for the occupation cluster. It is important to precisely excavate shovel tests to ensure comparable data on artifact density. During the field phase a consistent unit size was maintained by the use of a wooden template.

The extremely close-interval shovel test patterns applied to restricted areas of the sites provided an opportunity to statistically sample individual occupation clusters at sample fractions (percent area of an occupation cluster) of 4 to 36 percent. With this information as well as cluster size, we were able to extend the density measures for each occupation to estimates of total quantities of artifacts. Most of the clusters sampled corresponded to debitage concentrations ranging from primary core reduction loci to secondary core reduction and tool maintenance stations.

### *Cluster Spatial Point Pattern*

Spatial point pattern is a measure that informs on the distributional characteristics of an occupation cluster and is adapted from the quadrat count models of ecology (see Pielou 1969) and geography (Haggett et al. 1977:414-417). These models evaluate the spacing relationships of scatters of points by overlaying quadrat grids. Each grid quadrat serves as a sampling unit and the number of points contained within each quadrat is tabulated. The frequency distribution of point counts per quadrat is then compared to a theoretical distribution generated from any number of statistical processes. The simplest of these is the Poisson process. Importantly, the Poisson process provides measures of not only the amount, but also the kind of order present in an observed

spatial point pattern. Since the mean and variance in a Poisson distribution are equal, the variance/mean ratio,  $D_i$ , in a purely random point pattern is 1.0. Moreover, the ratio is expected to exceed 1.0 as clustering increases, while systematic patterns are indicated by ratios of less than 1.0. A formal test, the  $d$  statistic, for significant departure from the random pattern of an observed ratio has been developed by Bartko et al. (1968), which approximates a Chi-square test.

This measure is most appropriate for evaluating point patterns in large, heterogeneous clusters such as Mississippian residential sectors, multifamily hamlets, or slave rows. The prehistoric occupations so far isolated at Fort Bragg, however, are simple, homogeneous phenomena that are not well suited to this type of measure. At present, then, spatial point pattern statistics have not been applied to the recovered occupation clusters.

#### Environmental Zone Typologies

Once the database is constructed, it will be possible to develop classification systems with which to create environmental zone and occupation cluster typologies. The environmental zone typology will attempt to devise a breakdown that will not only distinguish microenvironments, but that will also apply the crosscutting dimension of geographic location. In this way, equivalent microenvironments can be differentiated to achieve even coverage of the Fort. This provides a basis for monitoring historical processes of geography that may have little relation to the precise microenvironmental context of a location. Migration and population center proxemics are examples of processes that can introduce settlement variability into a landscape that would be independent of microenvironment (see Haggett et al. 1977).

#### Regional Models

Once occupation cluster and environmental zone typologies are developed from the database, regional settlement models for each phase can be generated. This will proceed in two ways. First, associational relationships between environmental zone and occupation cluster types are to be examined. This will be accomplished through the application of Chi-square and non-parametric statistical measures of association. The other approach is to examine occupation cluster distributions on the landscape. A study of component distributions is useful as a basis for identifying settlement shifts through time. The approach can also be used to identify spacing relationships within single component distributions that may reveal the structure of land use systems.

#### Integration of Regional Models and Cultural Contexts

Interpretation of the regional models will be accomplished within the framework of established cultural and historic contexts. Because of the synthetic nature of the approach proposed here, it is likely that new insights can result in yearly modifications and redirections of such contexts. Appendix XI of the Fort Bragg ICRMP presents a detailed discussion of the current cultural and historic contexts for the Fort. A distilled overview of this document follows with suggestions of how a regional approach can improve our ability to address research questions and to evaluate the potential of specific properties to contribute to answering these questions.

#### Prehistoric Themes

Two major themes are identified in the discussion of prehistoric cultures represented on the Fort. One theme concerns the building of a culture chronology, while the other focuses on settlement

and mobility systems. Both themes are presented with the problem of scale. The arbitrary boundaries of Fort Bragg do not correspond, most likely, to the territorial ranges of the past cultural groups that occupied the region. The Fort is situated on a watershed divide centered on a large ridge spine running in an east-west direction in the Sandhills physiographic province (ICRMP 2001, Appendix XI:2). Most of the drainages are small, ranging between stream ranks of 1 and 2. A portion of the Lower Little River bottoms is contained at the northeastern boundary of the Fort, but most of the area consists of well-drained Sandhill ridge fingers jutting out from the divide. Thus, most, if not all, cultural systems using the area had larger territorial ranges than the geographic area of the Fort and incorporated a great deal more micro-environmental variability in their adaptations. Any approach devised to explain cultural systems at Fort Bragg must control for this limitation and develop methods to compensate for it. Fort Bragg CRM personnel have responded by extending their range of study to include extra-local studies of lithic and ceramic raw material sources, sand burial mound investigations (Irwin et al. 1999), and ceramic sequencing (Herbert 1999).

Intensive surveys conducted at the Fort have succeeded in recovering a wide range of diagnostic artifacts spanning the Paleoindian, Archaic, and Woodland periods. Building a local chronological sequence out of this corpus of information is underway, and attention to specific data needs during the site relocation and testing project can greatly advance this endeavor. Three areas of investigation are of particular relevance in this context. These are: 1) correlation of unidentified projectile point styles with sequences from adjoining regions, 2) detailed analysis of ceramics, and 3) identification of relative and absolute dating opportunities.

Many of the projectile points identified on the Fort correspond closely to the material

Coe (1964) described from the Hardaway and Doerschuk sites, but other points have yet to be correlated with projectile point sequences from neighboring regions. Daniel's (1998) reanalysis of the Hardaway Site indicates that a larger range of morphological variation was present there than was originally described. Moreover, researchers across the Atlantic Slope are beginning to appreciate that many unclassified types in their regions correspond closely to defined styles in other regions. The Early Archaic Big Sandy point, a large side-notched type originally identified in Alabama and Tennessee (Cambron and Hulse 1960; Kneberg 1956), is apparently quite common at Fort Bragg (see Benson 1998). It is also prevalent in the north Coastal Plain of South Carolina (Cable et al. 1998; Cable and Cantley 1998). Other types that can be correlated with point styles from more distant regions are now finding their way into regional sequences along the Atlantic Slope. Cantley (1998; 2002) has convincingly demonstrated the existence of a wide variety of Woodland triangular and stemmed points at Poinsett Range in Sumter County, South Carolina that closely correlate with the Tennessee sequence. In addition, Sassaman et al. (1990) have recognized a number of stemmed points (MALA) that associate with the terminal Middle Archaic period along the Savannah River that bear a remarkable resemblance to the late Middle Archaic Benton, Sykes, and White Springs styles in Tennessee and Alabama (see DeJarnette et al. 1962:70; Lewis and Lewis 1961:40-41). Goodyear (pers com. 2002) has found a large concentration of MALA points on the Lower Savannah River as well, and Cantley (2002) reports Sykes points in stratigraphic contexts consistent with terminal Middle Archaic at Poinsett Range in central South Carolina. These examples illustrate that greater stylistic similarity in projectile point sequences prevails across the Southeast than is commonly recognized and that attention to reported type descriptions could be useful in classifying unidentified point styles in local sequences. A quick scan of illustrations

of the projectile points collected during surveys at Fort Bragg indicates that there are a number of unidentified points that would probably correlate with existing type descriptions from adjoining regions. Attention to this detail would significantly increase the time sensitivity of the local sequence.

Herbert (2003) has built a ceramic sequence for the Cape Fear drainage system by combining a detailed, multi-attribute analysis centered on paste characteristics and surface treatment and an innovative thermoluminescent dating program that generates absolute dates for individual sherds. Preliminary dating and typological evidence suggest that various paste modes or series are chronologically ordered. The limestone-tempered Hamp's Landing series may date as early as 1500 or 2000 B.C., while the coarse sand-tempered New River series is somewhat later and has a chronological position clearly within the Early Woodland time range. The sherd-tempered Hanover and sand-tempered Cape Fear series date to later temporal positions and are regarded as Middle and Late Woodland affiliates. Preliminary information on a crushed rock series suggests that it may correlate with the Piedmont-based Yadkin series and may follow New River in the sequence (Herbert 2002, personal communication).

The next step is to build from these basic observations a culture-chronological phase sequence for the Cape Fear drainage system. This will require data from controlled excavations in which ceramic assemblages can be defined by recovery from sealed features or from single component deposits. In addition, phase breakdown may be facilitated by microseriation studies of series groupings in which the relationship between sub-series paste variation and surface treatment are monitored (see Cable 1998). During the site relocation and testing project numerous opportunities to investigate and recover samples from discrete deposits will be presented and these situ-

ations can yield data sets that would provide an opportunity to conduct microseriation analysis. These same contexts may offer an opportunity to recover additional TL dates or radiocarbon assays that would bolster the time sensitivity of the microseriation. Palmetto Research has devised a multi-attribute ceramic analysis of appropriate detail for conducting this sort of investigation. Specific information concerning the program is described in the artifact analysis section of the design.

As is stated in the statement of work (N5890020160), there may be situations in which the opportunity for absolute dating will become manifest. In these cases, consultation with the NPS COTR and Fort Bragg CRM personnel will determine the feasibility of submitting samples for special analysis based on context quality and other concerns. At present radiocarbon and ceramic thermoluminescence dating are the primary techniques used on the Fort. Clearly, if we are to operationalize a component/occupation cluster approach to regional analysis, improving the specificity of the phase sequence will provide great benefit.

Modeling settlement systems within the confines of Fort Bragg is difficult. Two factors contribute heavily to this. First, is the aforementioned restricted scale of the Fort, which probably does not encompass the full territorial range of any of the cultural systems that occupied the area. Therefore, we have, as a unit of study, a small window exposing only a portion of the systems we want to study. Second, the survey data, which must serve as the foundation for any regional study, is generated at the site level but needs to be transformed into component level units to facilitate clear models of settlement type distribution and interaction. The first limitation is unavoidable and must be compensated for by extra-local studies that serve to define the larger system in ways that make the materials on the Fort more



properly understood within a regional framework (e. g. Irwin et al. 1999). The other can be mitigated by reworking the survey data as we have suggested in this proposal.

Models to explain Paleoindian and Archaic period settlement/mobility systems in the Southeast are broad-based generalizations that receive much of their structure from empirical studies of one or a small number of sites (Anderson and Sassaman 1996). There is general agreement that territorial ranges were large, but contracted with time, and that the character of lithic assemblages reflects a shift from curated to expedient organization. Very little is actually known about Paleoindian site types and distributions anywhere in the Southeast. It is generally accepted that site types consisted of small residences and logistical camps, territories were large, and mobility was extremely high (see Cable 1982a; Anderson and Hanson 1988). The combination of high residential mobility and curated organization has been described by Kelly and Todd (1988) as a “High Technology Forager” adaptation. Early Archaic systems, by contrast, appear to have had larger residences that were probably occupied for longer durations (see Anderson and Hanson 1988; Cable 1996; Daniel 1996, 1998; Kimball 1996), as well as small residences. These larger residences may have served as seasonal aggregation sites that were, perhaps, the scenes of bulk deer harvesting activities. During the Early Holocene, then, there appears to have been a shift from systems of extremely large geographic range and high residential mobility to systems with mixed mobility strategies. These mixed systems appear to have been characterized by an alternating yearly cycle of high residential mobility and high logistical mobility strategies. It is assumed that the Early Archaic period was characterized by smaller territorial ranges and greater population densities than were extant in the Paleoindian period.

Precisely how large these territories might have been and in what manner they were distributed across geographic space has become a matter of great importance in understanding regional dynamics. One of the first attempts to address such phenomena was the “band-macroband” model proposed by Anderson and Hanson (1988). They hypothesized that Early Archaic groups were organized into a two-tiered social system. The minimal unit was a band numbering 50 to 150 people, while the maximum unit of the system was a macroband of some 500 to 1500 people, a minimal mating network according to Wobst (1974). Eight macrobands were speculated to have occupied the drainages of the Atlantic Slope from the Ocmulgee River in Georgia to the Neuse River in North Carolina. Each macroband was said to have maintained individual river basins as a territory and to have seasonally exploited the physiographic variability that cross cut each basin. A primary argument mustered in support of socially closed drainages was that extralocal raw material use was greatest along rather than between drainages. The lower frequency of extralocal material between drainages was explained by indirect acquisition (i.e. exchange).

Daniel (1996) has raised questions concerning this model based primarily on the problem of equifinality in distinguishing direct from indirect acquisition, since similar proportional patterns can be generated from other processes as well as exchange. Daniel argues that the patterns identified by Anderson and Hanson (1988) are just as easily explained as a function of the availability and proximity of lithic sources and that a model of cross-drainage territorial ranges is just as easily supported by the distributions they site. In response to this critique, Sassaman (1996) has examined drop-off curves for lithic raw material from transects in South Carolina and concludes that the primary route of isotropic raw material (i.e. Coastal Plain chert and rhyolite) was along rather than across drainages. Moreover, he con-

cluded that cross drainage movement was characterized by plateaus in the drop-off curves suggesting to him the possibility that cross drainage movement may have been accomplished by a different mechanism such as exchange.

The focus on raw material availability is an important one in evaluating the far-reaching scope and scale of adaptation in hunter-gatherer groups. However, until we develop better controls on lithic sources we may never bridge the problem of equifinality. The recent work at Poinsett Range in South Carolina exemplifies this problem (Cantley and Cable 2002). Here, a large number of small residential sites of the Early Archaic period have been identified through shovel testing and block excavations. The occupation clusters consist of what appear to be both multi-household and single household camps occupied for short durations.

Interestingly, the camps show an equal representation of Coastal Plain chert and rhyolite, which have mutually exclusive distributions by individual campsites. Poinsett Range is approximately equidistant between the Allendale chert dominated Lower Savannah River and the rhyolite dominated Pee Dee drainage. Based on these facts, one could conclude that the groups occupying the large Carolina Bay at Poinsett Range on a seasonal basis were actually moving between the Pee Dee and Savannah River during a seasonal round; stopping at the bay twice a year. Coastal Plain chert dominated residences, then, would be interpreted as camps established while moving away from the Savannah River and rhyolite dominated residences would represent movement originating from the Pee Dee area. This reconstruction would support Daniel's (1996) critique that territories may have been formed across drainages.

A problem with this interpretation is that the precise locations of the chert and rhyolite sources are not known. There are recorded chert

outcrops in the closer Edisto Basin that might have been used by these groups and the large quantity of rhyolite at Poinsett Range suggests that closer sources of this raw material may also be extant. If so, then the lateral movement of the groups would be much smaller and the territorial range could be seen as limited to the Wateree-Santee drainage. Lithic Sourcing, unfortunately, was not a part of the original study. Clearly, lithic source studies and unambiguous identification of raw material types is an extremely important facet of any regional study of territorial range. Palmetto Research will work closely with Fort Bragg CRM personnel to insure accurate identification of lithic material recovered during the project.

Middle Archaic systems along the Southeast Atlantic Slope are commonly characterized as foraging economies with high residential mobility (Blanton and Sassaman 1989; Cable 1982a; Sassaman and Anderson 1996). Population density is assumed to have increased from the levels of the Early Archaic period, and, by implication, territorial ranges were shrinking. Most comparisons of population density have been made strictly on the basis of site frequencies, which is not an ideal measure because it does not control for site function. Breaking sites down into their component units as suggested in this proposal may provide a basis for more effectively evaluating regional population levels over time. In the Midsouth and Midwest, there is ample evidence for the beginnings of a settlement hierarchy and at least semi-sedentary villages along major streams during this period (Brown 1985), but these features have not yet been documented on the Atlantic Slope. One possible exception is the terminal Middle Archaic component at the Big Pine Tree site on the lower Savannah River, which contains a dense assemblage of tools and debitage (Goodyear 2002, pers. com.).

Very little is actually known about Late Archaic settlement systems in North Carolina.

From surrounding regions, there is ample evidence of social organizational complexity (Smith 1986). Storage technology (i.e. baskets, storage pits, and steatite and ceramic vessels) proliferated during this period and sedentary villages with sturdily built habitation structures became common. Subsistence intensification is also well documented in estuarine and riverine settings throughout the Midsouth and southern coastal zones. In South Carolina, shell rings appear, which may have been monumental ceremonial features around which regional Late Archaic populations were tethered (Cable et al. 1993, 1994; Michie 1980). Perhaps the best evidence of intensified, semi-sedentary habitation along a major stream in eastern North Carolina is provided by the Gaston Site Savannah River component, which included a stained midden, stone-lined hearths, high artifact density, steatite vessel fragments, and full-grooved axes. Coe (1964: 119) observed that these traits suggested a “larger group occupying the site over a longer continuous period than had been true of the earlier periods.” In South Carolina, the interior creeks of the Coastal Plain were intensively inhabited by what appear to be seasonal Late Archaic residences (see Cable et al. 1994). These residences were spaced at regular intervals in a manner sufficient to effectively divide the uplands into equal foraging zones for exploitation by similarly constituted social groups, perhaps extended families. Fort Bragg may contain similar interior Late Archaic sites.

The ICRMP (2001: XI-34) indicates that Woodland period occupation on the Fort is characterized by small, ephemeral camps in the uplands and small habitation sites on stream margins. Their distribution patterns are not distinguishable from Archaic patterns, with the possible exception of a tendency to be located near water features (see Clement et al. 1997). Large village sites have not been documented, although floodplains of major streams are not well represented within the boundaries of the Fort. The small ephem-

eral sites in the uplands are regarded as generally reflecting small nuclear or extended family camps rather than logistical camps and are generally represented by “pot busts” or vessel aggregates. This same pattern has been identified over large areas of the South Carolina Coastal Plain and similar functions have been inferred (Cable and Cantley 1998; Cable et al. 1998; Cantley and Cable 2002). Block excavations have supported this inference. These camps consist of one to a few sherd aggregates each representing a single vessel, a discrete debitage concentration, and a cluster of tools situated along the edge of the debitage concentration. The tool cluster is inferred to represent the general vicinity of a hearth, and this is supported many times by a coterminous calcined bone concentration. This basic unit is inferred to consist of a hut containing a ceramic vessel(s), an exterior lithic reduction concentration and a hearth area positioned directly outside of the entrance to the hearth. These basic units can occur alone or in a small cluster, the latter being inferred to represent a multi-family camp. Secondary refuse deposits have yet to be isolated around these camps.

It is likely that larger and more permanent Woodland habitation sites will be found in abundance along the Cape Fear and Little Rivers, but these areas are not systematically investigated at present. The ICRMP (2001:XI-36) mentioned two village candidates from riverine settings. One of these apparently contains large pit features, which is a good indicator of permanent habitation. In addition, the Cape Fear drainage contains numerous sand burial mounds dating to the Woodland period. Irwin et al. (1999) suggest that these were uninhabited or vacant centers that served as the hub for ritual ceremony and exchange in a similar manner to that specified by Clay (1998) for the Adena mound complex. In this light, the mounds would have served as an integrative mechanism for a geographically dispersed population. It is also suggested that the presence of extra-local sumptuary goods in these mounds indicates that

the Woodland populations of the Sandhills were participating in an extra-local exchange network. One potential motivation that is offered for this participation was to form extra-local alliances in a situation where neighboring groups were exerting pressure on land and resources. Tracking the development and demise of this system through the Woodland period provides an important research focus for Woodland investigations on the Fort.

Very little evidence exists that documents Pee Dee culture occupation on the Fort (ICRMP 2001:XI-31). The same is true for protohistoric and early historic aboriginal cultures (ICRMP 2001:XI-33). The absence of Pee Dee material may indicate that the area of the Fort represented a cultural boundary in the late prehistoric period, separating indigenous Late Woodland groups from what may have been an intrusive Mississippian group at Town Creek (the Pee Dee culture). On the other hand, it may represent an occupation hiatus during this time frame. The reasons for the dearth of materials related to protohistoric and early historic groups might be different. It is clear from historic records that aboriginal groups inhabited the Cape Fear River Valley in the seventeenth century (Hilton 1967:72-79). Moreover, based on the similarity of ceramics from known protohistoric and historic villages in the northeast Piedmont (see Dickens et al. 1987; Ward and Davis 1993) to Woodland types, it is entirely possible that ceramics of this period have simply gone unrecognized.

### *Historic Themes*

The ICRMP (2001) indicates that the bulk of the historic archaeological remains on the Fort consist of late nineteenth and early twentieth century farmsteads, homesteads, hamlets, mills, naval stores facilities (i.e. tar kilns), and refuse dumps. Clement et al. (1997: 67-77) recognized four major categories of historic sites on the fort and

developed a comprehensive research program to guide research. The four site categories included: 1) agricultural, 2) community service centers, 3) industrial/special activity, and 4) transportation. The discussion to follow will be organized around these site categories and the suggested avenues of research.

**Agricultural Sites.** Clement et al. (1997:68) recognized six potential agricultural site types from a review of the land use history of the area. These include: 1) hunter-squatter residences, 2) subsistence farms, 3) general farms, 4) plantations, 5) share-tenant farms, and 6) renter-tenant farms. Each of these types is hypothesized to have been occupied by individuals with varying mixes of socio-economic status, ethnicity, and economic behavior. Hunter-squatters derived their main subsistence from hunting, fishing, trapping, and trading and adopted a mobile lifestyle (see Price and Price 1978). Subsistence farmers derived their main subsistence from corn agriculture on small plots of land. Their chief means of cash came from hiring out in the turpentine industry or producing turpentine on their own property. Generalized farmers were relatively wealthy individuals who owned larger farms of about 150 to 250 acres. They participated in a wide range of economic activities, including the naval stores industry, and achieved a higher social status than subsistence farmers. They were cash crop farmers who may have owned a small number of slaves. Plantations in the Fort Bragg area were primarily involved in the naval stores and timbering industry. Relatively large land and slave holdings distinguished this type of site. Plantations, hunter-squatter residences, and subsistence farms began to appear in the region during the 1730s, while generalized farmers did not enter the area until the 1840s. The last two site types did not appear in the area until the post-bellum period. Share-tenant farmers were poor sharecroppers while renter-tenant farmers were of a higher socio-economic status. Subsistence and



general farmers in the area were predominantly Scottish in ethnic affiliation, while tenant farmers represented a diverse ethnic mix of white Europeans and African Americans. The archaeological correlates of these various hypothesized site types have not yet been generated. A major emphasis should be placed on identifying agricultural site types archaeologically and evaluating their fit with this site type model. Archival records may provide an independent basis for evaluating site function and association.

**Industrial/Special Activity Sites.** Clement et al. (1997:71-72) indicate that the major industrial sites in the Fort Bragg area are connected to the Naval stores industry. Two common types of sites that are expected include turpentine distilleries and tar kilns. Distilleries typically had a still house or shed, a store shed, a cooperage for making rosin barrels, and a rosin screen and barrel platform. Larger plants may have supported small communities containing housing for laborers, stables for mules, and a blacksmith forge. Tar kilns are a common feature of pine barren environments on the Atlantic Slope and are documented to occur on the Fort. They are of interest because they may have been built and operated in diverse socio-economic situations. Their distribution relative to farmsteads, tenant farms, and plantations might reveal insights into this variation. Military sites are also included in this site grouping.

**Community Service Centers and Transportation Sites.** Community service centers include saw and gristmills, general stores, schools, churches, cemeteries, and hamlets. Bridges, ferrys, fords, roads, and railroad lines are the common types of transportation sites.

The challenge to conducting historical research on the Fort will be to link these diverse sites into a coherent study of socio-economic development, social mobility, and migration patterns. Clement et al. (1997:74) identify a number

of research questions that may be addressed with this information. Clearly, however, the basic building blocks of these studies will be supplied by building a firm archaeological site typology that can be correlated with the historical trends of the region.

## ANALYSIS SYSTEMS

The prehistoric ceramic program was developed in conjunction with Herbert's (2003) variables and typological nomenclature for the southern Coastal Plain of North Carolina. Special attention was placed on describing variation in paste composition and consistency. Paste variables included temper type, inclusion grain size, temper/inclusion density, and paste hardness. Exterior surface treatment variables included treatment type, application (i.e. cross-stamped, parallel stamped, dowel impressed, etc.), cordage diameter and twist type, weft and warp statistics, and other metric and qualitative data on minority treatment types. Interior surface treatment variables were constructed to describe finishing characteristics and contour regularity. Post-depositional and discard condition variables consisted of size class and interior and exterior surface condition (i.e. unmodified, eroded, etc.) This information is useful in defining deposit types (i.e. secondary or primary refuse) and settlement features such as commuting paths. Data on vessel form and function derived from rim contour and shoulder and base variables. Each rim sherd contour was drawn to scale. Rims of sufficient size had orifice diameter recorded as well. Finally, vessel wall thickness was measured with a sliding digital caliper. John Cable conducted the analysis.

The prehistoric lithic program was organized around techno-functional, core reduction, and culture-historic themes. The structure of the analysis was modeled on the Haw River attribute system (see Claggett and Cable 1982) and the

system developed by Daniel (1998) for the Hardaway Site. Projectile point and other formal tool types were identified with reference to pertinent type descriptions from adjoining regions (see Anderson et al. 1982, 1990; Cantley 1998, 2002; Chapman 1985; Claggett and Cable 1982; Coe 1964, 1995; Daniel 1996, 1998; Goodyear et al. 1989; Keel 1976; Oliver 1985; Tippet and Daniel 1987; Ward and Davis 1993). Debitage types were classified in accordance with core reduction strategies (i.e. FBR, biface thinning flake, bipolar flake, directional core flake, core rejuvenation flake, broken flake, angular chunk, blade, etc.) and reduction stage (i.e. percent cortex). Cores were identified in accordance with reduction strategies as well (i.e. directional core, multi-directional core, blade core, bipolar core, biface core/preform, etc.). Metric and weight were recorded for all cores anddebitage either as size class or dimensional measurement. Tools were identified by techno-functional type (i.e. utilized flake, steep-edged uniface, graver, end scarper, etc.) and metric and weight measurements were taken on each item. In addition, the type of flake blank on which the tool was made was identified. The location(s), length, and type of wear and retouch on edges were also recorded. Traditional metric measurements for projectile points were recorded (i.e. blade length, shoulder width, tang length, tang width, base width, thickness at the blade/haft juncture). Breakage types for all tools were recorded to assist in evaluating discard conditions and settlement function. Finally, lithic raw material identifications were made through consultation with the Fort Bragg CRM personnel, the type collection at the CRM office, and relevant references (see Abbott and Harmon 1998; Benson 1999; Daniel and Butler 1996; Lautzenheiser et al. 1994). Metavolcanic materials were subjected to more detailed subtype analysis to differentiate individual episodes of core reduction. Charles Cantley and John Cable conducted the analysis.

Carl Steen undertook the analysis of historic artifacts recovered under this contract. The

program was organized around South's (1977, 1979) classificatory system of functional categories. Adjustments to this system were made to account for multi-function industrial items common in the later nineteenth century. Various primary and secondary sources were consulted in the classification and dating of different artifact types (e.g. Collard 1967; Cunningham 1982; Dobson 1850; Fisher 1987; Hume 1980; Jones and Sullivan 1985; Kovel and Kovel 1986; Miller 1991; Nelson 1968; Orser 1988; Roenke 1978; Spivey 1979; Stewart and Cosentio 1976). The mean ceramic formula was relied on as a primary dating technique for historic components, but alternative dating approaches using glasswares and terminus post quem dates were used as well. Questions of time lag in different parts of the assemblages were addressed, allowing questions of lateral recycling and differentials in socioeconomic status to be addressed. Since the occupations were similar in age and cultural affiliation an effort was made to look at common items and determine their sources to reconstruct trade networks. Local pottery sources were also researched. Stoneware potters were active in Fayetteville throughout the nineteenth century, and earthenware potters were active in Moore County from the eighteenth century onwards.

## FIELD METHODS

The original delivery order called for 37 m<sup>3</sup> of shovel test volume and 52 m<sup>3</sup> of test unit volume spread across the 13 sites in variable amounts (Table 1). The initial site-by-site volume allocations were adjusted as needed and a substantial additional amount of volume was excavated by Palmetto Research as a contribution to the effort. The contribution was made to explore the utility of close interval shovel testing to elucidate individual occupations and to examine the role of such a strategy in increasing the efficiency of test unit placement.

---

### Use and Treatment of Previous Investigations and Data

Sites to be tested under this contract had an associated record of previous investigation. All pertinent reports, maps, site forms, and collections were reviewed prior to fieldwork. None of the reports suggested testing plans for any of the sites in the package. Efforts were made to relocate and map all previously excavated shovel tests on the sites and when successful were plotted on the field maps. Artifact density maps of the Phase I surveys were not generated because the shovel test patterns were irregular and not amenable detailed identifications of artifact concentrations. Since the Phase I grids were irregular and difficult to relocate, we established new grids at locations approximating the previous site datum according to GPS coordinates.

### Archival Investigations

Archival Research was conducted in two phases. First, at the beginning of the project, a general assessment of historical resources was undertaken to identify data sets with potential for contributing to our understanding of the individual sites and the property as a whole. This included a detailed study of pertinent secondary and primary historical sources, as well as an overview of more specific data sets including census and tax records. A study of historic maps was also undertaken at this time. The second phase was conducted prior to fieldwork at each individual site. Site-specific research included a chain of title and assessment of any available land plats, along with the correlation of such plats with the modern landscape. Many of Fort Bragg's inhabitants were poor and moved often and in many cases, they may not have owned the land they occupied. In these situations, we would not expect to identify the site inhabitants from property and tax records. The US Census manuscripts were consulted in this

regard and were marginally helpful in identifying residents. Mr. Steen conducted the archival investigation and gathered data from 1) the North Carolina State Site Files, 2) the North Carolina State Archives in Raleigh, 3) the Museum of the Cape Fear in Fayetteville, 4) and relevant county libraries. In addition, land acquisition records housed at Fort Bragg and in Washington, DC were inspected.

### Site Map

A map of each site was generated using an electronic transit and meter tapes. A standard grid was established on-site and was used to locate and map all shovel tests and test units. The grid coordinate system was calibrated in metric units and originated at the site datum. The site datum was assigned the arbitrary coordinates "N500 E500." This system was used to assign provenience data to all recovery contexts. The grid was constructed on a 10-meter interval.

The site datum was placed at a prominent point at each site. Its location was preserved with iron rebar measuring at least 30 inches in length. Five lbs of concrete was used to set and reinforce the datum position. The upper 6 inches of the metal datum was painted with orange day-glow spray paint and the datum bar was set between 2 and 4 inches above the ground surface. It was also flagged with surveyors tape. The marker was placed in a protected location such as next to a large tree and its location was tied to other site features by triangulation. The geographic location of the datum was recorded using a Trimble GeoExplorer 3 GPS unit, which has 1-5 meter accuracy with base station DGPS correction.

Locations of all shovel tests, test units, and cultural and natural features were mapped and illustrated on the site base maps. Elevation data was recorded for all old and new excavation units

Table 1. Summary of Cubic Meter Allocations by Site, Delivery Order 1.

Sites	Shovel Tests				Test Units				Totals	
	Total Number	Mean Depth (m bs)	Volume (m <sup>3</sup> )	Original SOW Volume (m <sup>3</sup> )	Total Number	Mean Depth (m bs)	Volume (m <sup>3</sup> )	Original SOW Volume (m <sup>3</sup> )	Total Original Volume (m <sup>3</sup> )	Total Actual Volume (m <sup>3</sup> )
31CD0810	252	0.714	16.19	2	6	0.63	3.80	4	6	19.99
31CD0815	125	0.38	4.28	2	4	0.41	1.64	3	5	5.92
31CD0832	210	0.4	7.56	5	6	0.33	1.96	3	8	9.52
31CD0898	206	0.6	11.12	2	8	0.55	4.40	4	6	15.52
31CD0913	203	0.61	11.14	3	10	0.50	4.95	5	8	16.09
31CD0919	161	0.6	8.69	4	9	0.47	4.26	5	9	12.95
31CD0924	378	0.7	23.81	5	7	0.68	4.76	5	10	28.57
31CD0927	174	0.64	10.02	1	5	0.55	2.75	4	5	12.77
31HK1094	114	0.74	7.59	4	5	0.58	2.91	5	9	10.50
31HK1101	97	0.35	3.06	3	5	0.52	2.84	3	6	5.90
31HK1109	73	0.4	2.63	3	8	0.60	4.80	4	7	7.43
31HK1126	178	0.75	12.02	1	9	0.47	4.24	4	5	16.26
31HK1142	88	0.69	5.46	2	8	0.58	4.60	4	6	10.06

mapped on the site. The topographic features of the site were mapped using a point density of 100 per hectare and a contour interval of 30-cm resolution was produced for each site. Contour mapping extended beyond the established site boundaries a sufficient distance to accurately depict the topographic situation of the site. All previously excavated units found in the field were mapped. Earlier maps of each site are illustrated in the report indicating the locations of previous non-relocated test units relative to the updated site maps. Isolated surface artifact finds were piece-plotted and their locations indicated on the site map. When dense overgrowth is encountered, lines of site were cut along grid lines and along other axes critical for the accurate mapping of the site.

Historic features such as structures, wells, cisterns, rock wells, privies, and other surface features were mapped using a transit and tape or

by establishing triangulated mapping points and pulling taped distances. Scaled drawings of each surface feature were produced and their locations were placed on the site map at a larger scale. Landscape features such as terraces were depicted on the site map.

#### Site Boundaries

Site boundaries were determined through the deployment of 10-meter shovel test grids oriented along cardinal directions. Shovel tests excavation continued along each grid point until two negative shovel tests were encountered along each cardinal direction. Surface artifact finds were also considered to represent positive tests and were closed out in the same manner as positive shovel tests when they occurred on the periphery of a site. The precise site boundary was



determined by connecting the midpoints between the last positive and the first negative test in all directions.

### Shovel Tests

Shovel tests were square and measured 30 x 30 cm. Square wooden templates were deployed to maintain a uniform shovel test size. Each test was excavated to subsoil, which was defined as B-Horizons of Late Pleistocene age or older with little likelihood of containing cultural deposits. All shovel tests were taken to a depth of at least 30 cm and if substrate was not reached, they were excavated to depths of at least 75 cm. Any shovel tests excavated during this project extended to depths equal to those excavated during previous investigations at individual sites. Fill from shovel tests was screened through 1/4-inch mesh hardware cloth to recover artifacts. In concordance with the research design, shovel tests were excavated in three arbitrary levels when possible. Level 1 extended to 30 cm below ground surface, Level 2 ranged between 30 and 55 cm, and Level 3 included deposits below 55 cm. A field log was maintained for all shovel tests and included the following information: 1) grid coordinates, 2) size, 3) maximum depth, 4) Number of Levels, 5) soil zones, 6) soil zone depth, and 7) artifact contents by level. Soil zones were described in standard, soil science terminology and coloration was recorded using Munsell color charts. Sufficient numbers of profiles were drawn of shovel test exposures to clearly delineate natural and cultural strata. The shovel test log data is provided in an Excel spreadsheet as appendix in this report. All shovel tests were backfilled prior to the end of fieldwork at each site.

### Test Units

Test units measured 1 x 1 m or larger. Test units were not be placed in areas of low artifact density or outside of the established site boundaries unless this placement was approved by the NPS COTR or Fort Bragg CRM personnel. Excavation proceeded in arbitrary 10 cm levels with the exception of plow zones. Plow zones were removed as single levels. In situations where it was not obvious whether the upper A-horizon represents a plow zone or some other kind of deposit, excavation proceeded in arbitrary 10 cm levels. In some situations, 5 cm arbitrary levels were excavated to better define potential vertical separation of cultural deposits. All test units were excavated to compact B-Horizons and at least one unit at each site was excavated into the subsoil to evaluate its potential to yield pre-Clovis cultural deposits. Dispersion of individual test units was the preferred placement strategy unless an unusual situation arose that required a larger contiguous exposure, such as the definition of a feature or deep deposits. The placement of test units was guided and justified with reference to artifact density maps generated from shovel test data. Deposits were screened through 1/4-inch hardware cloth to recover artifacts. Scaled profile drawings of all sidewalls were made and all soil zones and strata were described using standard soil science terminology. Deposit coloration was described using a Munsell color chart. Scaled plan and profile drawings were made of each feature, as well as staged drawings depicting the order of fill removal. Feature data included horizontal dimensions, depth, orientation, and associations. Test Unit logs were maintained in the field.

### Metal Detector Surveys

Historic sites that did not exhibit evidence of military metallic debris were subjected to a systematic metal detector survey. Positive

hits were flagged and mapped with a transit and meter tape. Positive hit locations were considered eligible as potential candidates for test unit placement. Recovered metal artifacts were stabilized in accordance with the curation standards of the Office of State Archaeology, Division of Historical Resources, North Carolina Department of Cultural Resources.

### Photography

Both Black and White and Color 35-mm photographs were taken of each subject. Photographs documented the site area, field activities, excavation units, and other findings of the investigation conducted at each site. At least two photos of the site area were taken. All photos of units and features contain scales, north arrows, and a restaurant-style menu board recording site number, provenience, date, and subject. A photo log was maintained in the field and included the following information: 1) roll #, 2) negative # for print film, 3) slide # for slide film, 4) Fort Bragg Accession #, 5) name of contractor, 6) delivery order number, 7) direction of view, 8) subject matter, and 9) date. This information is placed on each slide or print.

### GPS Data

A Trimble GeoExplorer 3 unit was used to take GPS readings in the field. The unit has an accuracy rating of 1 to 5 m with post-processing software differential correction. Differential correction was performed using GPS Pathfinder Office software. GPS data were collected in WGS84, NAD27, and NAD83 formats, and they are reported in Appendix A.

### NRHP EVALUATIONS

The main goal of the evaluative process to be implemented within the framework of this project was to arrive at definitive statements concerning the eligibility of the targeted properties. In the past, the common approach, as in many areas, has been to make such decisions within a virtual vacuum because a regional database has not been built. A database can provide a powerful tool for determining eligibility for four reasons. First, it will quantify what we know about the cultural systems in the region. Second, it will supply a basis for assessing redundancy by allowing for the stratification of the study area into meaningful environmental units in which the representative completeness of site or component types can be monitored. Third, it will serve as a basis for linking historic contexts, which are component-based in their construction, with the archaeological record. Fourth, it provides managers with a more sophisticated model for identifying which data values at a potentially eligible site are actually important within the perspective of the entire region. That is, a site may contain multiple components, but through regional quantification it may be determined that the information from only one or a small number of the components is important due to redundancy. This would allow for much more specific and efficient data recovery programs that focus on a manageable fraction of the occupation history of a particular site. There is an understandable concern on the part of researchers to recover information on all occupations when data recovery projects are implemented and this is largely the consequence of site-based evaluations. Unfortunately, this is an extremely wasteful approach and when we must consider what to do with scarce funding, it behooves us to seek other approaches that will achieve a more optimal fit with our goals and objectives. It is the opinion of Palmetto Research that we will not be successful in implementing these new directions until we begin to realize the research potential of

survey and testing data, which are the foundations of regional databases.

NRHP evaluations in this report are made within the framework of a developing regional database. Significance assessments are linked to the cultural and historical contexts discussed in the ICRMP (2001) and in this document through a consideration of the role each identified component played in its respective regional system. The regional database quantifies the relative importance of each component for reconstructing regional systems and data redundancy is analyzed. Sites will be recommended eligible for inclusion on the National Register in the event that certain components are evaluated to contain information of importance to history and prehistory. Detailed data recovery plans are developed for each site considered eligible. These plans focus on the relevant components and present efficient research programs that specify the objectives of excavation and appropriate field and analytical strategies to achieve these goals. Quantitative estimates of the volume and location of excavation units required are presented and the method of analysis is detailed.

## CURATION

All artifacts, field and analysis notes, photographs, slides and negatives, electronic media, collected, generated, and/or produced as a consequence of this project is to be prepared for curation at Fort Bragg. Curation procedures were performed in accordance with the Archaeological Curation Standards and Guidelines, Office of State Archaeology, Guidelines for the Disposition of Archaeological and Human Remains, 36 CFR 79 (Curation of Federally Owned and Administered Archaeological Collections, and the Fort Bragg Curation Guidelines.

## Treatment of Artifacts

All materials collected during the project, including artifacts, floral and faunal remains, and soil samples were cleaned, stabilized and treated as appropriate. All collection materials were clearly labeled using a permanent medium. Provenience data was organized by a bag list. Artifacts were separated into two classes and boxed separately by site. Class 1 artifacts include diagnostic or extraordinary items that are likely to be examined regularly by researchers at Fort Bragg or that are suitable for exhibition (e. g. projectile points, diagnostic sherds, brass buttons, etc.). Class 2 artifacts consist of items without diagnostic value or that are unlikely to be examined regularly by researchers at Fort Bragg (e.g., lithic debitage, residual ceramic sherds, nail fragments, soil samples).

## Associated Records

Associated records include site forms, original field notes, prepared maps or drawings, photographic materials, oral histories, artifact inventories, laboratory reports, computerized data on CD, diskette, or tape, NRHP nomination forms, reports, bibliography of all resources consulted including public and archival records, and administrative records (36 CFR 79.4(a)(2)). All original paper records (e.g., field notes, site maps, topographic quad maps, laboratory records, artifact inventories) were submitted to Fort Bragg for permanent curation.

## Native American Graves Protection and Repatriation Act (NAGPRA)

No Native American human remains were recovered during the project. Had they been identified during the course of this project, the Fort Bragg Cultural Resource Manager/Archaeolo-

gist would have notified Native American groups immediately. In addition, work would have cease in any unit producing the human remains until proper consultation could be arranged. Native American groups with potential interest in Native American Graves Protection and Repatriation Act-related cultural resources identified at Fort Bragg during the course of testing carried out under this contract will be notified of project results by Fort Bragg in accordance with Fort Bragg NAGPRA Standing Operating Procedures. Human remains will also be treated in accordance with existing federal guidelines.



# Chapter 4. Prehistoric Culture History

Lands within what is now Fort Bragg are situated at the interface between the well-defined cultural sequences of the North Carolina Piedmont and Coastal Plain Provinces. The following discussion draws extensively from the work of others (Coe 1964; Claggett and Cable 1982; Phelps 1983; Ward 1983; Oliver 1981, 1983; Anderson and Hanson 1988; Smith 1986; Daniel 1998). Archaeologists have divided the prehistory of North Carolina's Coastal Plain region into three general stages (Paleoindian, Archaic, and Woodland), based for the most part on inferred economic adaptations and ceramic traditions. A fourth possible stage of development, the Pre-Clovis, predates the Paleoindian and is a highly contested unit of cultural division within North and South America. As of the present, no pre-Clovis sites have been identified in North Carolina.

## PALEOINDIAN PERIOD (10,500-8,000 B.C.)

The earliest evidence for human occupation in North Carolina began during the Paleoindian period near the end of the late Pleistocene. The Paleoindian period is generally dated from ca. 10,000 and 8,000 B.C. throughout North America. While various chronologies and arti-

fact sequences have been proposed over the years (Haynes et al. 1984, Gardner and Verrey 1979, Oliver 1981), the on most often cited chronology for the southeastern United States today, is proposed by Anderson et al. (1996:7). These authors subdivide the 2,500-year span into three sub-periods. The earliest sub-period is represented by the Clovis Point that has been more securely dated from sites in the southwestern and plains regions to ca. 9,250 and 8,950 B.C. The middle sub-period (ca. 8,950-8,550 B.C.) is identified by assemblages containing Cumberland, Simpson, and Suwannee fluted and non-fluted projectile points. In contrast, the late sub-period (ca. 8,550-7,550 B.C.) is characterized by fluted Beaver Lake and Quad types and fluted and non-fluted Dalton and Hardaway point styles. Oliver's (1981) proposed revision of the North Carolina Piedmont sequence extends the temporal range of the Paleoindian period back to 12,000 B.C. and includes the Palmer Corner-notched type into the terminal phase of the Paleoindian period. This latter projectile point type is most commonly recognized as Early Archaic (see Goodyear et al. 1979) and this perspective is adopted in this overview.

Traditional interpretation of Paleoindian period subsistence practices has relied on a view of Paleoindians as hunters of late Pleistocene

megafauna. Research beginning in the mid to late 1980s indicates that reliance on megafauna may have been the norm in the western part of North America, while plants and small game comprised a larger portion of the southeastern Native American's diet (Sassaman et al. 1990:8). Although, the Paleoindian period corresponds with the final stages of the late Pleistocene megafauna extinction, when 35 to 40 known species of large mammals became extinct (Martin 1984, Pielou 1991), only a few examples of the direct exploitation of megafauna in the southeastern United States have been documented. Most of these come from wetland and underwater sites in Florida, including a butchered giant tortoise carcass recovered from Little Salt Spring (Clausen et al. 1979), a bison antiquus skull with an embedded projectile point fragment in the Wacissa River valley (Webb et al. 1984), and a worked proboscidean bone from a sink hole in northern Florida (Dunbar et al. 1990). "Modern" species such as caribou have been recovered at Holcombe Beach, Michigan (Cleland 1965) and Dutchess Cave Quarry, New York (Funk 1977), and white-tailed deer and wapiti have been positively identified at Meadowcroft Rockshelter, Pennsylvania (Adovasio et al. 1977). The importance of meat in the Paleoindian diet, however, can sometimes be overemphasized. Ethnobotanical remains from Meadowcroft Rockshelter and Shawnee-Minisink in Pennsylvania (McNett et al. 1977) indicate that secondary resources including fish, birds, hawthorn, and nuts were also incorporated into various eastern woodland Paleoindian subsistence systems.

Paleoindian occupation in the Southeastern United States is one characterized by high mobility, high range (territorial) mobility, low population density, and a focal hunting economy (Anderson and Joseph 1988, Gardner 1979, Goodyear 1979, Goodyear et al. 1989, Meltzer 1988, Smith 1986, Steponaitis 1986, Williams and Stoltzman 1965). However, some researchers are beginning to question these traditional

views and are advocating new theories. One such theory is that Paleoindians were less mobile and selected choice areas for initial settlement. Only after this initial area was colonized, did Paleoindian groups expand into other regions (Sassaman et al. 1990:8). Another theory stipulates that early Holocene mobility patterns should have shifted from logistically based settlement systems to more residentially mobile systems as temperatures warmed and the homogeneity of resource distributions increased (Cable 1982a). Contrary to the traditional view (Caldwell 1958) of a gradual shift toward more sedentary systems through time, more recent studies (Anderson and Hanson 1988; Anderson and Schuldenrein 1983, 1985) argue that Paleoindian and initial Early Archaic populations may have maintained more stable residences than those of the later Early Holocene and Middle Holocene.

In spite of increasing research into Paleoindian sites, the Southeast in general and North Carolina specifically, has few sites with diagnostic Paleoindian artifacts and even fewer sites offering more than surface materials. In northern Virginia, Gardner (1974) has proposed a Paleoindian settlement model based on his excavations and surveys in and around the Flint Run site. The model states that a dependence on highly siliceous lithic resources to maintain technological "readiness" was necessary given the highly mobile nature of Paleoindian groups. Perkinson's (1971, 1973) North Carolina fluted point study suggests that Paleoindian site densities may have been higher in the Piedmont than in the Coastal Plain. In fact, his numbers indicate that Paleoindian occupation in the Coastal Plain was very limited, as only 15 percent (13 of 83) of the points came from Coastal Plain counties. Daniel's (1998) more recent geographic study of 189 North Carolina Paleoindian projectile points (Clovis, Quad, Redstone, and Simpson types) yielded the same results with a large percentage (90%) of the points clustering near lithic source areas in the western mountains

and Piedmont regions of the state. The remaining 10 percent (n=19) occurred within the Coastal Plain where lithic resources are believed to be scarce. One of the Paleoindian points in Daniel's study was recovered at site 31HK118 on Fort Bragg. Two other fluted points from this site are known to exist, but are not curated on the installation (Griffin et al. 2001). Another fluted point was found at Site 31CD145 on an upland watershed divide six miles west of Stedman, North Carolina (Robinson 1986). In addition, a late Paleoindian Hardaway Point was recovered at site 31SP103, a large multi-component site, located along the South River (Hackbarth and Fournier-Hackbarth 1981).

To the south of Fort Bragg in South Carolina, a different picture of Paleoindian settlement patterns emerges. A study of the South Carolina Paleo-point Database reveals a relatively high density of Paleoindian points in the northern counties of South Carolina within the Fall Line and Piedmont counties including Kershaw (n=20), York (n=12), Lexington (n=11), Lancaster (n=8), and Chesterfield (n=7). All the counties, except York County, are located along the Fall Line in an area much like the environment of Fort Bragg. Because of the apparent heavy concentration of Paleoindian points in this zone, Goodyear et al. (1989:44) have speculated that this zone evidenced a disproportionately high rate of reoccupation or was the location of prolonged, seasonal base camp occupations.

#### ARCHAIC PERIOD (8,000-1,000 B.C.)

The Archaic period marks a shift towards increasingly new dietary patterns reflecting a variety of birds, fish, mammals, and reptiles in the site assemblages. The Archaic sequence has been traditionally divided into three sub-periods: the Early Archaic (8000-6,000 B.C.), the Middle Archaic (6,000-3,000 B.C.) and the Late Archaic (3,000-

1,000 B.C.). In general, the Archaic is viewed as a lengthy period of adjustment to changing environments brought about by the Holocene warming trend and rising sea level. Caldwell's (1958) model of wide-niche or "broad spectrum" hunter-gatherer adaptations continues to succinctly define the period for most archeologists. However, the differences between the cultures at either end of the sequence are immense and indicate that major cultural and adaptive changes occurred during the Archaic period.

Continuity with the Paleoindian period is reflected in the tools associated with Early Archaic lithic assemblages. Projectile points (i.e., Big Sandy, Hardaway Side-Notched, Palmer Corner-Notched and Kirk Corner-Notched styles) remain stylistically formalized and show evidence of economizing re-sharpening strategies, hafted end scrapers continue to be well represented and there is an emphasis on the curation and use of cryptocrystalline raw material such as chert and high grade metavolcanics. Cleland (1976) has suggested that these attributes indicate a continued focus on the hunting and processing of big game animals. In support of this argument, Goodyear et al. (1979:104) note that plant processing tools such as grinding stones are extremely rare in Early Archaic deposits. Chapman (1977:95, 116) reports the presence of eight grinding slabs in Kirk Corner-Notched deposits at Ice House Bottom in Tennessee, but he was unable to find "weed seeds" in the flotation samples from these levels. Acorn and hickory nutshells, however, were abundant. Faunal remains from Early Archaic associations in the Southeast indicate a wide spread emphasis on white-tailed deer, but a variety of smaller game including gray squirrel, raccoon, turkey and box turtle have also been identified (Goodyear et al. 1979:105).

Subsistence data then, suggest that hunting large game (i.e., white-tailed deer, elk, and bison and antelope on the western margin of the eastern

woodlands) was indeed a major element of Early Archaic economies as was true for the Paleoindian period. It is also true, however, that there was significant emphasis on nut and seed gathering (i.e., oak, hickory, black walnut, hackberry, persimmon, copperleaf, pigweed, goosefoot, maygrass, knotweed, purslane, grape, etc.) and trapping of smaller terrestrial game and aquatic resources (i.e. mussels, fish, turtle, ducks, geese, quail, turkey, beaver, squirrel, skunk, bobcat, opossum, porcupine, raccoon, otter, etc.). In fact, a review of subsistence data from major Dalton and Early Archaic contexts in the Southeast leads Bruce Smith (1986:10) to observe that Early Archaic subsistence systems were diverse, “providing little support for the existence of a focal economy,” and that the available faunal-floral assemblages resemble the “broad spectrum” composition of those of later assemblages in important ways. He further notes that the subsistence resources commonly associated with the Early Archaic period indicate significant exploitation of both upland, closed canopy, climax forests and edge areas such as river valleys where stages of early succession were fostered by unstable geomorphological conditions and possibly prehistoric land use practices.

The widespread occurrence of Early Archaic sites throughout the Southeast, and in both riverine and non-riverine settings (Sassaman 1996, Daniel 1992, O’Steen 1992, Goodyear et al. 1979:105, Ward 1983), suggests population increases from the Paleoindian period and perhaps a greater emphasis on foraging strategies. The few excavations located along or near the Atlantic Slope that have isolated preserved Early Archaic living surfaces (Anderson and Schuldenrein 1985, Broyles 1971, Chapman 1975, Claggett and Cable 1982, Coe 1964) do not recognize evidence of long term habitation. The principal features of these floors consist of rock clusters, hearths, small pits, raw material caches, and, very occasionally, grinding slabs. Evidence

of shelters (i.e., postholes) has not been positively identified and it is speculated that they were temporary huts as opposed to permanent domiciles. This kind of pattern is consistent with a residentially mobile settlement system, in which various site types may occur. While individual researchers sometimes disagree on terminology and the methods used to identify various site types, all generally believe that Early Archaic assemblages can be divided into base camps, foraging camps, and special-purpose sites (Anderson and Hanson 1988, Anderson and Joseph 1988, O’Steen et al. 1986, Cable 1996, Daniel 1998, Kimball 1996).

The scale of Early Archaic settlement systems has been difficult to define. Goodyear (1983) suggests a Fall Line centered settlement system. Anderson and Hanson (1988) have elaborated on this general scheme by proposing a seasonal round for Early Archaic systems in which the Piedmont was occupied during the summer and early fall, the Coastal Plain was visited in the spring, and the Fall-Line was inhabited during the fall and winter. Occupation of the Fall Line is characterized by the establishment and/or reoccupation of fall aggregation sites and winter base camps, while the Piedmont and Coastal Plain were exploited by dispersed foraging units. It is further proposed that the territory of each Early Archaic band was distributed along a major drainage and that the South Atlantic Slope contained eight such bands distributed from northern Florida to Pamlico Sound, North Carolina (Anderson and Hanson 1988). Daniel (1994, 1998), on the other hand, presents a persuasive argument for a cross-watershed Early Archaic settlement model. He suggests groups were tethered to high-grade lithic sources and they used the available resources of several drainages in the course of their seasonal or yearly rounds.

The mid-Holocene warming trend, the Hypsithermal, has been seen as the primary cause of subsistence and settlement changes that



took place during the Middle Archaic. Stemmed points replaced earlier notched points, with the Kirk Stemmed/Serrated (6,000-5,800 B.C.), Stanly (6,000-5,000 B.C.), Morrow Mountain (5,500-4,000 B.C.) and Guilford (4,000-3,000 B.C.) being the most common diagnostics of this period. Other technological changes noted in Middle Archaic assemblages include the discontinued use of end scrapers (Cable 1982b, Kimball and Chapman 1977), raw material proportions tend to reflect local availability (House and Ballenger 1976), and cryptocrystalline materials are de-emphasized as distance to source increases (Goodyear et al. 1979: 111). In addition, the use of storage facilities and human interments increased during this period (Griffin 1974, Wetmore 1986, and Chapman 1977). One commonly referenced trend is the notion that ground stone tools increase dramatically during the Middle Archaic. The large ground stone tool assemblage from the Early Archaic deposits at Rose Island (Chapman 1975:153-170), however, has led Bruce Smith (1986:18-21) to cogently argue that there does not appear to be a measurable difference in the sub-periods on the basis of present evidence. Consequently, he argues that there is no compelling reason to suggest that a technological revolution took place during the Middle Archaic in the Southeast.

Research in South Carolina has greatly influenced archaeological perceptions of Middle Archaic technology and mobility/settlement strategies employed along the Southeast Atlantic Slope (Ward 1983, Poplin et al. 1993, Blanton and Sassaman 1989, Anderson 1996, Kowalewski 1995). The consensus is that Middle Archaic technology is characterized by localized raw material procurement and use, generalized toolkits with little concern for extended curation of tools, and a lessened concern with the quality of raw materials used to manufacture tools (Blanton 1983). This “Adaptive Flexibility” model, as it has become known, characterizes Middle Archaic occupations as con-

taining highly redundant assemblages whereby all stages of lithic tool reduction regularly co-occur on sites and quartz was selected over less abundant, higher-quality stone as a “trade-off between curation and expediency” (Sassaman 1983:84).

As more Middle Archaic components are being intensively examined, evidence of more complex and varied mid-Holocene systems is emerging. Intensive testing and data recovery projects have successfully identified Middle Archaic period residential occupations along the South Carolina Fall Line and Coastal Plain. The Middle Archaic components along the Fall Line have yielded preserved surface and basin-shaped hearths, and a diverse tool assemblage, including Morrow Mountain bifaces, scrapers, graters, spokeshaves, and groundstone tools presumably used for numerous maintenance and production related activities (Wetmore 1986, Radisch personal communication 2000, O’Steen 1994). In contrast to these highly diverse assemblages, less diverse Middle Archaic assemblages in the uplands of the Coastal Plain have been identified and found to exhibit internal structural patterns consistent with short-term residential camps. These camps conform well to Yellen’s (1977) models of hunter-gatherer camp structure consisting of huts, close-by exterior hearths identified by tool and faunal bone concentrations, and nuclear area artifact scatters (Cable et al. 1996; Cable and Cantley 1998, and Cantley and Cable 2002). Contrary to the prevailing view of Middle Archaic groups adopting an expedient technology, these assemblages contain significant percentages of reused and curated tools. Work at Richburg Quarry (38CS217), a quarry located in the “quartz rich” landscape of the Piedmont, illustrates how Middle Archaic groups sought high-quality quartz outcrops for the production of efficient, transportable, and functionally diverse tool forms (i.e., bifacial cores and preforms) without substantially affecting their carrying costs (Cantley 2000). This curation strategy would be important

for groups who practice high residential mobility, but are constrained in terms of how far they can move, and therefore may not always be located near a high-quality source of raw material.

Other studies linking hunter-gatherer mobility/settlement models to the regional lithic resource base and raw material procurement patterns have attempted to document seasonal movements and group territories. Sassaman and Anderson (1994:106-107, 124,127-128) documented the widespread occurrence of Morrow Mountain period groups over most of the Piedmont with the greatest number of occupations occurring in the inner Piedmont between the Broad and Savannah rivers. Tippet (1992:136), on the other hand, proposed a settlement model tethered to individual drainages whereby various Morrow Mountain groups inhabited the Yadkin-Pee Dee drainage, Broad-Congaree drainage, and the Savannah River drainage. Later during the later Middle Archaic period, an analysis of Guilford points represented in the statewide collector survey suggests a shift in territory (Charles 1981:53). This data indicates that the later Guilford period is characterized by a reduction in group territory to an area between the Broad and Yadkin-Pee Dee rivers in the northern Piedmont and Fall Zone of South Carolina. Archaeological surveys conducted within the Sumter National Forest provide additional support for the Broad River being a territorial boundary with few Guilford assemblages occurring south and west of the Broad River (Benson 1995; Bates, personal communication 1998). The Yadkin-Pee Dee drainage poses another type of boundary where an abrupt change occurs in Guilford tool assemblages. West of the Yadkin River, Guilford assemblages are manufactured predominately from quartz, while east of the Yadkin River, assemblages are made almost exclusively of metavolcanic materials (Coe 1964, Abbott personal communication 1998). Cantley (2000) has suggested that the Yadkin-Pee Dee river drainage may have served

as a possible social boundary (see Wobst 1977) that divided contemporary groups and established rights and privileges over the use of specific raw material resources within each group territory. Fort Bragg, located north and east of the Yadkin-Pee Dee drainage, should therefore reflect a prevalence of metavolcanic manufactured tools. Similar to the South Carolina Fall Line/Sandhills, numerous Middle Archaic sites have been discovered at Fort Bragg (Benson 1995). Most if not all of these sites are characterized as technologically simple, low-density occupations with little evidence of differentiation in site function (Griffin et al. 2001). It should be noted that few of these sites have undergone intensive investigation to determine their composition and structure.

Several studies (Carlson 1979, Goodyear et al. 1979:111, Hanson 1982:18-19, Morrow and Jeffries 1981) argue that the technological and social changes that occurred during the Middle Archaic signify an increase in sedentism and a reduction of mobility. Alternatively, Cable (1982a) has suggested that Middle Archaic groups adapted to the Holocene-warming trend through increased residential mobility. These two positions are not necessarily incompatible. The drastic increase in Middle Archaic sites documented throughout the Southeast, suggests that population levels were continuing to expand, which would almost certainly entail a contraction of local group territories (Steponaitis 1986:372). This in turn would have created pressures to intensify exploitation in foraging radii by moving residences more frequently. It is unlikely that territories would have been small enough to exploit the entire home range from a single residence until more intensive subsistence technologies such as horticulture or agriculture were incorporated into the subsistence base. Thus, range reduced, residential mobility under intensification conditions may in fact represent a common stage in the development of sedentism. Other researchers in the Southeast have noted a similar tendency toward increased

residential mobility in the Middle Archaic, especially during the earlier phases of this sub-period (Anderson and Hanson 1988, Anderson and Schuldenrein 1985, Blanton and Sassaman 1989, Cantley et al. 1984, Sassaman 1988).

Bruce Smith (1986:26) argues that the strongest evidence for increased sedentism during the Middle Archaic is represented by a series of prepared clay house floors recovered from middle and initial late Holocene contexts in Alabama and Mississippi (Ensor and Studer 1983, Rafferty et al. 1980:263-269). Concomitant with these developments was an intensification of aquatic resource exploitation along the river systems of the mid-continent (i.e., Tennessee, Cumberland, Green Rivers). Some of the settlements associated with this intensification have been characterized as either permanent villages or, more often, semi-permanent but seasonal base-camps with enormous middens (Ensor and Studer 1983, Klipple and Turner 1983, Jeffries 1982, Steponaitis 1986:372, Smith 1986:22-24). These developments all appear to associate with the terminal phases of the Middle Archaic, during the period from about 4,500 to 3,000 B.C., and suggest that major shifts toward more sedentary hunter-gatherer adaptations began toward the latter half of this sub-period. Similar evidence of riverine and/or coastal resource intensification is not documented for the Atlantic Slope until about 3,000 to 2,500 B.C. (Claffin 1931, Milanich and Fairbanks 1980, Stoltman 1974), which may indicate less extreme pressures to adopt sedentary adjustments in this area of the Southeast.

Climatic and environmental pressures to adjust settlement systems in the direction of greater residential mobility in the Middle Holocene may have been offset at some point by range reduction due to tighter population packing (Anderson and Joseph 1988:130-131). One factor indicating a range reduction is the shift toward a heavy reliance on local lithic materials

during the Middle Archaic (Blanton and Sassaman 1989, Sassaman 1983, 1988). Greater residential mobility may very well have typified Early Archaic and early Middle Archaic settlement systems regardless of gradual range reduction processes (Sassaman 1988), but other factors toward the latter half of the Middle Archaic period may have hastened a shift back toward logistical strategies, albeit within a much reduced range. One such factor affecting the Coastal Plain and coastline was the formation of swamps and estuaries as sea level began to stabilize (Brooks et al. 1989). Moreover, the Middle Holocene climate appears to have been drier, but also more variable, suggesting to Blanton and Sassaman (1989) that at least the Coastal Plain environment was changing toward a greater degree of patchiness and therefore would have presented Middle Holocene foragers with the opportunity to exploit an environment with increasing spatial resource segregation. Consequently, pressures toward the reversion to logistically oriented settlement systems may have been manifest earlier in the Coastal Plain than in the Piedmont.

The Late Archaic has long been described as a time when populations mastered their adaptation of post-Pleistocene changes, as reflected in population growth, increased sedentism, technological innovation, and greater subsistence exploitation (Sassaman et al. 1990:11). The Late Archaic is visible in the archaeological record in numerous ways. The design of the broad Savannah River Stemmed Point, the initiation of freshwater shell fishing, and later the development of fiber-tempered pottery are all temporal markers of this time. Four major trends characterize Late Archaic adaptations across the Southeast: 1) initial, low-level plant cultivation, 2) dense middens with evidence of dwellings and storage facilities, 3) the initial use of stone and ceramic containers, and 4) intensification of exchange relationships (Smith 1986:28-42, Steponaitis 1986:373). Most of these trends are evidenced along the Atlantic

Slope, although some aspects have been much more fully defined for the Cumberland Plateau and the interior Gulf States.

Large shell middens of the Stallings Island phase occur throughout the coast and interior river valleys of the Sea Island Coastal Region of Georgia and central and southern South Carolina. These sites indicate extensive secondary resource exploitation and the establishment of semi-sedentary occupations (Claflin 1931, Stoltman 1974, Ledbetter 1991). Steatite vessels are widely distributed along the Atlantic Slope and steatite net-sinkers have been found along the coast (Coe 1964: 112-13, South 1959, Stoltman 1972). Fiber-tempered pottery was also initially produced during the Late Archaic and is now known to have a similarly wide distribution to that of Steatite vessels (Phelps 1983, South 1976). Stone technology indicative of seed processing such as polished and pecked stone artifacts, mortars and hammerstones are common and so are subsurface storage pits in the Sea Island Region (Stoltman 1972: 48-49). The remnants of a prepared clay floor and scattered postholes at Rabbit Mount, South Carolina provides further evidence of more stable habitations (Stoltman 1972).

In North Carolina, fiber-tempered Stallings ceramics occur most frequently on sites in the southern region of the Coastal Plain and rarely on sites further north and in the interior Coastal Plain (Phelps 1983). Two sites containing fiber-tempered ceramics have been recorded at Fort Bragg, but only one of these has been confirmed (Griffin et al. 2001). The use of steatite vessels was apparently more widespread than fiber-tempered ceramics. Benson (1998) reported finding steatite sherds on five sites during testing phase work on the Overhills Tract of Fort Bragg. Given the overall size of the military installation, it can be assumed that many other sites containing steatite vessel fragments await discovery.

Evidence of cultivation is one aspect of the generalized set of trends for this sub-period that is yet not well defined for the Atlantic Slope. The so-called Mexican “container” domesticates (i.e., bottle gourd and squash) and weedy seeds that evidence domestication in later Woodland period deposits are present in Late Archaic assemblages in Tennessee, Kentucky, Illinois, and Missouri (Chapman and Shea 1981:70, Conrad et al. 1984, Cowan et al. 1981, Cowan 1984:236-239, Kay et al. 1980:818). This appears, however, to be simply a product of the intensity and history of archeological research in these two regions. Recently, a macroplant specimen of bottle gourd (*Lagenaria siceraria*) from a burial at the Windover site in east-central Florida has been radiocarbon dated at  $7,290 \pm 120$  rcy B.P. (Doran et al. 1990), suggesting that cultivation began as early, or even earlier, on the Atlantic Slope. Similarly early radiocarbon dates (ca. 7,000 rcy B.P.) for squash (*Cucurbita pepo*) have been obtained from sites in Illinois (Asch and Asch 1982). Consequently, it is becoming increasingly probable that low-level cultivation in the Southeast was well underway in the middle to terminal phases of the Middle Archaic sub-period.

The nature of Late Archaic occupation in North Carolina is not well understood at present. Much of the trappings of the Stallings Island culture of the Sea Islands region (ie. massive shell middens and an elaborate bone and antler industry) are lacking (see Claggett and Cable 1982:43), but investigations are too limited to determine the nature of the subsistence system. At Fort Bragg, Late Archaic sites nearly equal the number of Middle Archaic sites, but consist of a limited array of tools usually associated with Late Archaic tool kits. The fact that these sites are situated in the Sandhills, somewhat distant from a major drainage, suggests they may represent short-term special purpose and/or residences that were occupied during times of group dispersal. Whether North Carolina Late Archaic groups were organized



similarly to the seasonally sedentary groups of the interior southeast or whether they were operating at a much lower level of social intensification is a major research question.

Numerous studies have argued that the early emphasis on sedentism manifest in the dramatic appearance of terminal Late Archaic shell rings and midden sites, and also the subsequent pressures toward settlement dispersal and residential mobility during the Woodland period, were the consequence of complex ecological changes of the coastal landscape brought about by sea level rise and fluctuation over the past 5,000 to 6,000 years (see Anderson 1982:376, Brooks et al. 1989, Colquhoun et al. 1980, DePratter and Howard 1977, Phelps 1983, Trinkley 1989:78). A rather dramatic sea level rise during the middle Holocene was slowed (Colquhoun et al. 1980) and pollen sequences suggest that pine was replacing oak as the dominant forest arboreal as a consequence of a wetter climate and more hydric soil conditions (Brown 1981; Watts 1979, 1980, 1983). As sea level began to stabilize after about 3,000 B.C., the modern estuarine ecosystems were established and the interior river swamps attained their maximum expression. Sea level has never completely stabilized since the end of the Pleistocene, and a series of 1-2 meter fluctuations have been documented for the period spanning 2,200 B.C. to A.D. 1,200 (Brooks et al. 1986).

Brooks et al. (1989) have related this sequence of environmental changes to perceived changes in the geographic distribution and structure of terminal Late Archaic and Woodland shell middens and terrestrial sites on the South Carolina Coastal Plain. Stallings and Thom's Creek shell middens are associated with the initial formation of stable estuaries in the region and, although they represent rather sizeable heaps of shellfish refuse in locations below the Santee River, it is possible that a number of the middens which formed during the regressive interval (dated to 1,800 B.C.) are now

submerged below modern sea level. Moreover, a regressive interval between 1,100 and 100 B.C. may be responsible for burying Early Woodland shell middens along the coast (see also DePratter 1977, DePratter and Howard 1981). At present, it is not known if similar environmental conditions may have buried Late Archaic and Early Woodland sites on the North Carolina coast.

Late Archaic systems of interior Coastal Plain rivers also appear to have been significantly affected by these changes. The documentation of intensively occupied upland settlements from this time period in the Middle Savannah River Valley has led to a reconstruction that stipulates spring and summer aggregation along the river terraces and fall-winter household dispersion into the headwaters of upland creeks (Brooks and Hanson 1987; Sassaman 1983; White 1982). Furthermore, there are indications that the aggregation sites can be grouped into two hierarchical levels, with the largest sites of this type occurring at the Fall Line (i.e., Stalling's Island, Lake Spring) and Coastal (Bilbo, White's Mound, Cox) ecotones. The higher order Fall Line aggregation sites are speculated to represent seasonal villages where communal anadromous fish harvests were organized. Lower level aggregation sites occur near the mouths of tributary streams and they are speculated to represent specialized staging areas for residential groups prior to summer dispersal.

The difference in technology between populations in the Fall Zone and Piedmont, as contrasted with the Coastal Plain, suggest the existence of some form of sociopolitical differentiation. Variation in point types between the two physiographic regions support this hypothesis, as does the development and use of fiber-tempered pottery on the Coastal Plain and its delayed introduction in the Piedmont. Conversely, the widespread use of soapstone for cooking on sites in the Piedmont contrast sharply with the limited soapstone cooking artifacts recovered from Coastal

Plain sites. These differences reflect the nature of social and political differences during the Late Archaic (Sassaman et al. 1990:12).

#### WOODLAND PERIOD (1,000 B.C.- A.D. 1500)

The Woodland period in North Carolina spans the time interval from 1,000 B.C. to A.D. 1500 and it is divided into “Early” (1,000-300 B.C.), “Middle” (300 B.C.-A.D. 800), and “Late” (A.D. 800-1500) sub-periods. In most regions of the Southeast, the Late Archaic-Woodland transition is seen as continuity with the emergent patterns of intensification gradually building in magnitude (Steponaitis 1986:378-379). These patterns consisted of an increased emphasis on gardening and exploitation of seeds, greater adjustments toward sedentism, and elaboration of mortuary ritual and political control.

Perhaps the most significant development distinguishing the early portion of the Woodland period from the Late Archaic was the full-blown emergence of what Ford (1985:347-349) refers to as the Eastern Agricultural Complex throughout many regions of the southeastern United States. This complex was primarily composed of indigenous species of seed-producing commensal weeds including sunflower (*Helianthus annuus*) sumpweed (*Iva annua* var. *macrocarpa*), goosefoot (*Chenopodium bushianum*), maygrass (*Phalaris caroliniana*), knotweed (*Polygnum erectum* L.), little barley (*Hordeum pusillum* Nutt.), and giant ragweed (*Ambrosia trifida*). The former three exhibit signs of domestication (i.e., enlarged achenes, decreased seed coat thickness, brittle rachis, etc.) by the terminal phases of the Late Archaic, while the others appear to have been intentionally transported and cultivated in Late Archaic and Woodland contexts (Cowan 1984). The bottle gourd and squash, as discussed previously, represented very early Mexican domesticate introductions and along with this seed com-

plex comprised the basis of the Early Woodland gardening subsystem. Maize was a relatively late entrant into the eastern woodlands, with an initial date of appearance of only about A.D. 300 (Yarnell and Black 1985). In spite of the rather substantial evidence for agriculture, isotopic analyses of Early and Middle Woodland skeletal populations do not indicate a dependence on cultigens (Bender et al. 1981, Boutton et al. 1984, Van der Merwe and Vogel 1978). Early cultivation in the eastern woodlands may very well have not represented an economically more important food source than a number of wild food subsystems such as nuts, aquatic resources, and deer (Steponaitis 1986:379).

Evidence gathered in the southeastern United States for sturdy, if not permanently occupied, houses is abundant for the Early Woodland period. Along the Gulf and Atlantic coasts, the massive shell middens of the Late Archaic sub-period are replaced by more diffuse scatters of shell that are interpreted as the refuse from individual households (Milanich and Fairbanks 1980). Settlements appear to be small, ranging in size from about 5 to 10 households, and cover less than a hectare in area. Similarly small Early Woodland settlements with ample remains of houses have been investigated in the interior Southeast and in the mountains and Piedmont of the Atlantic Slope (Faulkner and McCollough 1978, Keel 1976, Kline et al. 1982, McNutt and Weaver 1983). Generally, these settlements are viewed as seasonal in nature, but annually re-occupied. Some late Middle Woodland settlements in the interior Southeast have been hypothesized to represent permanent villages due to the apparent pairing of cold- and warm-season structures, sturdier house construction, larger and more dense midden formation, and the absence of “cache-type” storage facilities (Steponaitis 1986:381). To date, evidence of Woodland period villages or large, single component sites possibly representing occupation(s) by a single or related groups is lack-

ing at Fort Bragg (Clement et al. 1997). Instead, the emerging picture of the region's occupational history can be characterized as one of seasonal ephemeral campsites occupied by single and/or multiple households and short-duration special purpose sites. This pattern of land-use does not appear to change significantly throughout the various Woodland periods.

The Sandhills region of North Carolina has yielded little data useful for constructing a local artifact sequence or chronology. Instead, archaeologists have relied on diagnostic artifacts, projectile points and ceramics described for the Piedmont and Coastal Plain provinces, to reconstruct the prehistoric landscape of the Sandhills. In the Piedmont and Blue Ridge provinces, it has been argued that the Gypsy-Stemmed and Swannanoa-Stemmed projectile points evolved out of the earlier, Late Archaic Savannah River point type tradition (Oliver 1985). Gypsy points were recovered in the Early Woodland deposits at Doerschuk and Gaston sites (Oliver 1985), while Swannanoa points have been identified in similarly dated deposits at the Warren Wilson site (Keel 1976, Oliver 1985). The Early Woodland deposits at Doerschuk contained not only Gypsy-Stemmed points, but also Badin Triangular points and Badin ceramics.

The Early Woodland ceramic assemblage for the eastern Piedmont and Coastal Plain regions is not well understood. Coe (1964:27-30) defined Badin ceramics as exemplifying cord-marked, fabric-impressed, or plain surface treatments with a hard, compact paste with a very fine river sand temper. Unfortunately, the description of Badin ceramics is very similar to the Middle Woodland Vincent series pottery of Virginia's Roanoke Basin and the New River and Deep Creek ceramics of the Coastal Plain. Since no absolute dates exist to place the Badin ceramic assemblage within a secure temporal framework, questions persist as to its placement in the local cultural sequence.

East of the Piedmont on the Coastal Plain, Early Woodland period assemblages include Thom's Creek, Hamp's Landing, New River, and Deep Creek ceramics. Thom's Creek pottery in North Carolina is mainly restricted to the lower southeast corner of the state in Brunswick and New Hanover counties; however, a few specimens have been recovered as far north and west as the Fort Bragg vicinity (Griffin et al. 2001). Hemp's Landing ceramics is a relatively new ceramic type that is differentiated from other ceramics by its limestone or marl-tempered paste (Hargrove 1993, Hargrove and Eastman 1997, Herbert 1999, Hebert and Mathis 1996). These ceramics have been recovered in features and stratigraphic contexts intermediate between Early Woodland Thom's Creek and Middle Woodland Hanover pottery horizons along the lower Cape Fear drainage and along the coastal margin as far north as Carteret County. Radiocarbon dates ranging between ca. 2000 to 500 B.C. have been obtained from features containing these ceramics. To date, no Hemp's Landing ceramics have been recovered from the Fort Bragg project vicinity. The remaining two Early Woodland pottery types identified within the North Carolina Coastal Plain are the New River and Deep Creek ceramics, occurring south and north of the Neuse River, respectively. These two Coastal Plain types share the same surface treatments and they are believed to be contemporaneous with Piedmont Badin ceramics. Three TL samples taken from New River sherds suggest a date range from about 1,200 to 400 B.C. for this ceramic series.

During the Middle Woodland period (300 B.C.-A.D. 800), differences between the northern and southern regions of the North Carolina Coastal Plain continue to be expressed in ceramic typology. The North Carolina northern Coastal Plain region is the Mount Pleasant series. This series will not be described since it is located some distance from the project area. Along the southern coastal region, Phelps (1983) incorpo-

rates both the Hanover (grog-tempered) and Cape Fear (sand-tempered) series into the Cape Fear phase. More recently, the Hamp's Landing series has been added to the southern coastal sequence. All of these ceramic series exhibit cord marked, fabric or net-impressed surface treatments. Unfortunately, few absolute dates exist to aid in the placement of these ceramics into a temporal sequence. Radiocarbon dates from South and North Carolina suggests a date range from 200 B.C. to A.D. 500 for the Hanover series, while only one available date for Cape Fear ceramics was calibrated to A.D. 1028 (Eastman 1994).

Yadkin series ceramics mark the advent of the Middle Woodland period in the Piedmont region. This series was defined by Coe (1964) who saw it as a direct development out of the earlier Badin ceramic series. The major difference between these two pottery types is that the Yadkin series incorporates the use of angular fragments of crushed quartz into the paste. Otherwise the surface treatments remain the same with mostly fabric-impressed, cord-marked, and some check-stamped examples occurring at the Doerschuk site (Davis 1987). At Town Creek, Coe (1995) added simple stamping as a new surface treatment to the Yadkin series. The presence of simple stamping in the Town Creek assemblage suggested to Coe that these ceramics occurred late in the Yadkin sequence. Once again, no radiocarbon dates are available.

Throughout the Southeast and Midwest the later part of the Early Woodland and the Middle Woodland periods mark the beginnings of very distinctive mortuary complexes characterized by the incorporation of burial mound features. These features are commonly regarded as evidence for the emergence of segmentary lineages, systems of ranked social status, and "big-man" leadership roles (Brose and Greber 1979, Smith 1986:45-50, Steponaitis 1986:382-383). Typically, such systems are unstable and particularistic in the details

of integration and the regional diversity of mortuary ritual evinced in these burial mounds is generally regarded as a reflection of these characteristics.

In North Carolina these mounds are low-lying, ranging between about 0.6 and 1.2 meters in height, circular to oval in shape, and vary between about 6 and 18 meters in diameter. J. A. Holmes, a geologist with the Department of the Interior, was the first to investigate and report on excavations into several of these mounds in 1883 (see MacCord 1966). His major area of concentration was in Duplin County, southeast of the Falls Lake region. Charles Peabody (1910) also excavated one of these features in Cumberland County in the early twentieth century. A number of other mounds including the McFayden Mound in Brunswick County (South 1966), the McLean Mound in Cumberland County (MacCord 1966) and the Red Springs (Keel 1970) and Buie (Wetmore 1978) mounds in Robeson County have been the subject of more recent investigations. Although not recognized as such, the Holiday "ossuary" site near Galivants Ferry on the Little Pee Dee River in Horry County, South Carolina may also represent the remnants of a sand burial mound (Rathbun 1989).

Burials are of three types in these North Carolina mounds, all of which commonly occur in a single mound. These include cremations, bundle burials of varying degrees of completeness and flexed inhumations. Mound size tends to correlate with burial population. Stewart (1966:69) estimates that the Mclean Mound, which was about 18 m in diameter, contained about 500 individuals, while Holmes reported only eight skeletons from a mound of about 7 m in diameter in Duplin County of which he excavated one-half. Other than the fact that these cemeteries are mounded, they exhibit some burial patterns not unlike those of Iroquois and Algonkian ossuaries in the Middle Atlantic states according



to Stewart (1966). The burial populations from both the sand mounds and the ossuaries reveal an under-representation of children, especially of infants. Moreover, both contain smaller numbers of adult males than females. Cremation is also a shared trait, although no ossuary has yet produced as many as the 32 individuals identified at the McLean Mound. Stewart's cranial measurements also suggest that the McLean Mound population is more closely aligned with the Middle Atlantic physical type than that of southerly groups.

Herbert (personal communication 2005), however, has pointed out that there are very real differences in burial practices between mounds and ossuaries. At the McClean Mound, he argues that single individual interment was the mode and bodies were accumulated over a period of several hundred years. Collington phase (Algonkian) ossuaries, by contrast, appear to contain multiple interments associated with single events. Moreover, Cashie phase (Iroquoian) ossuaries tend to contain clusters of multiple individuals interred in numerous events.

Very little information is available to discuss internal structural patterning in these mounds, as the quality of excavation reporting and the degree of preservation are both very poor. Holmes (1883) mentioned in several different places in his notes that he did not detect any sub-mound disturbance, but he did observe a ringed depression around one mound that might resemble the borrow pit formations excavated around the central tomb features of the coastal Georgia mounds (see Thomas and Larsen 1979: 35). Peabody observed what he called a "sod line" under one burial mound, which he attributed to a recent forest fire. Alternatively, this may represent a premound clear burn patch that initialized mound construction, as discussed above for mounds on the Georgia coast. No mention has ever been made of central tombs or differentiated shell and/or sand lenses in the North Carolina mounds, but

this may be a factor of the intense pot-hunting damage that has accrued over the years and the lack of modern excavation studies.

Based on a very broad correlation of the burial mound trait in the eastern woodlands, Phelps (1983:35) has assigned the sand burial mounds in North Carolina to the Middle Woodland period. The single radiocarbon date of A.D. 970 from the McLean Mound (MacCord 1966:17) suggests either a very late Middle Woodland or early Late Woodland time range for this particular mound. The MacFayden Mound near Wilmington, NC contains predominantly Cape Fear series ceramics (South 1966) in its fill, which would correlate, in general, with the Wilmington or St. Catherine's phases on the Georgia Coast (DePratter 1979). Experience from excavations in the Georgia Sea Island region (Thomas and Larsen 1979), however, would indicate that dating the use of the burial mounds from sherd inclusions can be very problematic. Since these mounds appear to be built-up from nearby fill, which often contains earlier midden, the best that can be said of the MacFayden Mound is that it cannot date earlier than the Cape Fear series, but can be younger.

Across the eastern woodlands, the Late Woodland period (A.D. 800-1500) has often been characterized as a time of cultural decline, principally because of the apparent simplification of the burial complexes (Griffin 1952). This view is highly biased, in many respects, toward the events surrounding the collapse of the Hopewell Interaction sphere in the Midwest where dramatic declines in the diversity and "exotic" character of grave offerings occurred (Brose and Greber 1979). Over many other areas of the Southeast, however, the differences are less extreme, and, if anything, reflect a developmental continuum. The burial mound sequence of the Georgia coast exemplifies such a trajectory (Cable et al. 1991, Caldwell and McCann 1941, Larsen and Thomas 1982, Thomas and Larsen 1979). It is neverthe-

less generally held that this sub-period witnessed a decline in “big-man” authority systems, primarily as a response to population expansion, filling, and dispersal (Smith 1986:52-53). Settlements apparently remained small and subsistence systems changed little, with the possible exception of an increased emphasis on maize agriculture.

Ethnobotanical analyses of Late Woodland sites from the North Carolina Piedmont indicate that maize agriculture was well established by this time interval. At the Donnaha site, a large village in the upper Yadkin River Valley, maize (*Zea mays*) was ubiquitous in the flotation samples and comprised over 40 percent of the recovered macrobotanical remains (Mikell 1987:11). Other cultigens in the samples included the common bean (*Phaseolus vulgaris*), another Mexican import, squash, and sumpweed. A wide array of wild plant remains were also recovered from the site including hickory nuts, acorns, grape, plum maypops, hackberry, walnut, hazelnut, and butternut, but the ubiquity and relative abundance of cultigens at the site demonstrates a heavy reliance on agricultural food production (Mikell 1987). This emphasis on agriculture is evidently seen at smaller, seasonal camps or hamlets of this time interval. At site 31Am278 (dated to around 800 rcy B.P.), a small Piedmont upland site in Alamance County, North Carolina, maize remains comprised six percent of the macroplant sample from an apparent storage pit (Cantley and Raymer 1990:68-75). The overall contribution of maize is considerably less than that of the Donnaha floral assemblage and this led the authors to suggest that the corn might have been transported to the site from a base camp. Goosefoot is also present in the samples from the pit and may represent yet another cultigen in the sample. Regardless of the function of the site (i.e., wild food procurement camp, farmstead, etc.), the presence of maize and other cultigens on small as well as large sites attests to the overall importance of agriculture during the Late Woodland sub-period in North Carolina. In

spite of Ward’s (1983:72-73) reservations about the importance of agriculture in Woodland subsistence systems, recent ethnobotanical analyses indicate that it would be counterproductive to deemphasize the role of maize agriculture during the Late Woodland.

Late Woodland material culture in the Fort Bragg project area is expected to be influenced most by the Siouan-speaking inhabitants of the southern Coastal Plain as well as groups occupying the eastern Piedmont region. South (1976) characterized the ceramics during this period as belonging to the Oak Island phase. Oak Island ceramics are shell-tempered and surface treatments include cord marked, net-impressed, plain, and fabric-impressed. Phelps (1983:48) suggests that the increase in fabric-impressing and the presence of simple stamping may align the Oak Island phase with the Colington phase centered along northern Coastal region. The Uwharrie phase characterizes the Late Woodland Piedmont ceramics. This pottery is differentiated from the earlier Yadkin pottery by larger vessel sizes, scraped interior surfaces, and a higher proportion of crushed quartz in the paste that often times protrudes though both vessel walls (Coe 1952, 1995). Exterior surface treatments typically associated with this pottery type include net-impressed, plain, fabric-impressed, and cord-marked decorative types.

#### MISSISSIPPIAN PERIOD (A.D. 1200 -1500)

The hallmark of South Appalachian ceramic industries is, in the earlier phases at least, complicated stamped surface treatments (Ferguson 1971). This is contrasted by a continuance of net impressed, cord marked, fabric impressed, and simple stamped treatments in the more northerly Late Woodland ceramic assemblages (Davis 1987:211). Throughout the Southeast, the presence of this complex is regarded as a manifesta-

tion of chiefdom level organization and highly ranked or stratified social units (Steponaitis 1986: 391, Smith 1986:55-56). Some of these societies have also been speculated to represent macropolities and to have been organized along the lines of paramount chiefdoms, with a series of internally centralized, quasi-autonomous polities loosely integrated into a hegemony around a paramount center.

The most northerly expression of the South Appalachian Mississippian culture is the Pee Dee manifestations located approximately 40 miles west of Fort Bragg in the middle Yadkin River Valley (Coe 1952). Coe (1964:124) saw the South Appalachian manifestations of North Carolina as intrusive into the area and dated this event as occurring around A.D. 1500. The radiocarbon dates from the Town Creek Mound, however, indicate that the Pee Dee culture was present in North Carolina in the 13th and 14th centuries A.D. (Dickens 1970:79). Moreover, the ceramic time-line of the Pee Dee pottery correlates well with the trajectory of change in other South Appalachian regions that occurred between about A.D. 1150 and A.D. 1400 (DePratter and Judge 1986, Hally and Rudolph 1986). These lines of evidence strongly suggest that the Pee Dee culture appeared in North Carolina around A.D. 1200. Whether it represents an intrusion into this area is not known.

Pee Dee ceramics are generally stamped with a carved paddle or smoothed and burnished. While a small percentage of the vessels exhibit simple stamping or check stamping, the majority of stamped ceramics exhibit distinctive curvilinear and rectilinear designs. Decorations usually found on burnished vessels include applied rosettes, pellets, or punctations around the shoulder. Textile and corncob-impressions are present, but rarely occur in the Pee Dee ceramic assemblage. To date, there is only sparse evidence of Pee Dee occupations on Fort Bragg.

Another potential Mississippian mound center is Buie Mound in Robeson County. This site contains a very anomalous sherd assemblage in its fill that Wetmore (1978:65) ascribes to the Pee Dee and Lamar periods. The predominant ceramic type here is a sand-tempered burnished plain ware. Inspection of the pictures of the associated decorated types in the report indicates the presence of features (ie. sloppy incised complicated stamped designs, below-the-rim reed punctations, and shoulder and rim ticks) that would correlate with a number of Lamar assemblages in other regions including the Mulberry phase (A.D. 1450-1550) in the Wateree Valley, South Carolina (DePratter and Judge 1986), the Dyar phase (A.D. 1450-1600) in northern Georgia, and terminal occupation ceramics from Town Creek (Reid 1967). If this association is valid, and the ubiquitous distribution of plain burnished and incised sherds in the fill of the mound supports this interpretation, then the Buie Mound represents the latest known evidence of the persistence of the burial mound phenomenon in the Southeast.

#### PROTOHISTORIC AND EARLY HISTORIC NATIVE AMERICANS (A.D. 1400-1600)

In recent years it has become apparent that the transition from late prehistoric to historic adaptations was accompanied by some rather dramatic changes in the settlement pattern, health status, social organization, and even regional location of Southeastern Indian groups (Smith 1987). Even before Europeans had established a strong presence in the Southeast, the effects of disease and demographic disruption were felt throughout the region. In North Carolina, Merrell (1987:19-21) identifies four stages of contact. The initial stage extended from about A.D. 1525 to 1625 and consisted of primarily indirect contacts with the Spanish and English involving the exchange of material goods and disease epidemics. The next stage was a relatively short interval,

lasting about 50 years. During this time, numerous clashes with Piedmont groups were undertaken by the English and European settlement extended into the southern Piedmont. The next brief stage, ending in the early eighteenth century, signaled an end to the semblance of a preserved Native American cultural system and the beginning of the historic period. This stage saw major conflicts throughout the Carolinas and numerous displacements and extinctions of native groups. The Saponi vacated North Carolina and joined the remnants of the Occaneechi and the Tutelo and Monocan groups in Virginia, while the Sara, Eno, and Keyauwee merged with the Catawba Indians of South Carolina.

Probably the most detailed information concerning subsistence-settlement practices used by Native American groups in the southeast during this time period, is the data obtained from the Wall (mid-sixteenth century), Mitchum (A.D.1625-1665), and Fredricks Sites (A.D. 1680-1710) located in the Piedmont region of North Carolina (Dickens et al. 1987). Flotation data indicate that all of these villages maintained agricultural plots and raised significant quantities of corn, beans, squash, and/or gourd (Gremillion 1987). Most native seed species assigned to the Eastern Agricultural Complex (Ford 1985) are also present, but in relatively small quantities. This may indicate a decline in the use of such crops after the prehistoric period. Wild plant species of fleshy fruits (i.e., grape, persimmon, hawthorn, maypop, etc.) and nuts (i.e., acorn, hickory, walnut, etc.) are well represented. Gremillion (1987:271) observed very few differences in the ethnobotanical samples, and concluded that the overall patterns of use were very similar. Exceptions included a possible increased dependence on corn and a shift toward the almost exclusive use of hickory at the later historic villages. Holms (1987) noted the same overall similarities in the faunal assemblages. Deer and fish continued to represent the major subsistence categories.

There is very little evidence of status differentiation in either the village plans or the mortuary patterns of any of these sites. Within the palisade enclosures of the Wall and Fredricks sites are a series of rather loosely arranged household-sized (i.e., 20 to 35m<sup>2</sup>), domestic structures of oval-to-circular-to-subrounded plan (Petherick 1987). No unusually large, special purpose or community houses have been identified from the partial excavations. One primary difference between the two sites, however, is the sturdy construction and long sequence of occupation at the Wall site versus the apparently flimsier character of construction at the Fredricks site. Petherick (1987:77-80) contends that these characteristics indicate that the Wall site represents a stable, permanent village, while the Fredricks site, which contains a much greater proportion of “cache-type” storage facilities (subterranean pits), was probably a seasonally reoccupied residence. Increased residential mobility during the historic period may very well have been an adjustment to European settlement, and the patterns reflected at the Wall and Fredricks sites serve as an example of how early ethnohistoric accounts of Native American groups may be misleading as direct analogs to prehistoric adaptations.

Changes are also noted in the mortuary patterns of these sites, but the overall conclusion is that these changes were made within the context of relatively egalitarian socio-political structure and that they simply reflect historic processes (Ward 1987:108-110). None of the burial assemblages exhibits discernible differences in grave content that could be argued to represent status differentiation. The differences that do exist reflect common age and sex roles, or, rarely, some type of craft specialization. At the Wall Site and Upper Saratown, graves are loosely arranged within the palisade enclosure in a similar pattern to the houses, and it is suggested that these cemeteries represent the interments of a lineal descent group. Thus, each site appears to represent a lin-



eage segment of a larger tribal entity. The larger number of burials at Upper Saratown is speculated to represent the effects of European disease epidemics during the early historic contact period. The Fredricks site, by contrast, contained small, discrete mortuary plots distributed around the exterior perimeter of the palisade wall. It is speculated that these discrete clusters represent different ethnic groups or lineage segments of the same tribal group that were brought together as the processes of dislocation and re-amalgamation continued after A.D. 1675.

The type of ceramics that might occur in or near the project area at this time would be a most likely Hillsboro phase ware. Hillsboro phase ceramics were large, simple-stamped and check-stamped jars, tempered with medium-to-fine sand or feldspar (Dickens et al. 1987, Ward and Davis 1993). At the present time it is not known if the material culture, subsistence-settlement, or mortuary practices described above have any direct analogs for contemporaneous groups living in the Sandhills region. For sure, sites like Wall, Mitchum, and Fredricks are extremely rare or non-existent in such marginal environments.

# Chapter 16. Synthesis

This chapter discusses the major synthetic findings of the prehistoric investigations of the project. These are grouped into three topics: 1) Vertical Coherence of Deposits, 2) Culture-Historic Sequence, and 3) Occupation Types and Settlement Patterns. Each topic is treated in turn below.

## VERTICAL COHERENCE OF DEPOSITS

Archaeological deposits in the upland ridge systems of the Sandhills and Coastal Plain of the Southeast Atlantic Slope are generally recovered in the upper 70 to 80 cm of unconsolidated sandy soils. These relatively level, upland surfaces are generally considered to represent stable, pre-Holocene deposits, but the associated Holocene archaeological deposits are buried within them and consistent, age-structured vertical sequences are reflected (see Michie 1990; Cable et al. 1998; Cable and Cantley 1998; Cantley and Cable 2002). Both biomechanical (see Balek 2002; Johnson 1990; Leigh 1998) and depositional processes such as regional eolian deposition, colluviation, and alluviation (see Brooks et al. 1998; Brooks and Sassaman 1990) have been cited as potential contributors to this phenomenon. Identifying the precise combina-

tion of processes leading to the formation of these archaeological deposits is an important component of understanding the structure and organization of discrete occupation “floors” that are consistently isolated in these sediments.

Although there has been informal recognition that the cultural deposits identified in the Sandhill deposits of Fort Bragg may have vertical coherence as in neighboring areas, very little systematic data are available to evaluate this proposition. Vertical data gathered during this project, however, do demonstrate that the deposits are vertically structured in a coherent cultural sequence. Both shovel test and test unit data support this observation. Shovel tests were excavated in three levels: 1) Level 1, 0-30 cm bs, 2) Level 2, 30-55 cm bs, and 3) Level 3, greater than 55 cm bs. A very basic vertical pattern identified in the shovel test data is the contrasting distributions of ceramic and lithic artifacts (Table 114). Eighty-four percent of the ceramic sherds, which are associated with the latest cultural phases, were recovered from Level 1, at depths of 0 to 30 cm bs. Only about 64 percent of the lithic debitage, which is affiliated with both Woodland and earlier Archaic phases, however, was found in Level 1. A much higher percentage of lithic debitage was recovered in Levels 2 and 3 compared with ceramics. Con-

Table 114. Vertical Distributions of Ceramics and Lithic Debitage from Shovel Test Levels

Artifact Class	Level 1		Level 2		Level 3		Grand Total
	n	%	n	%	n	%	
Ceramics	661	84.10	120	15.27	5	0.64	786
Lithic Debitage	2320	64.30	1178	32.65	110	3.05	3608

firming evidence is supplied by the diagnostic lithic tools recovered from shovel tests (Table 115). All 11 of the Woodland projectile points were found in Level 1, while Late

and Middle Archaic points were recovered in both Levels 1 and 2. Early Archaic diagnostics were primarily contained in Level 2, at depths greater than 30 cm bs.

Table 115. Vertical Distributions of Lithic Diagnostics from Shovel Test Levels

Lithic Diagnostics from Shovel Tests	Level 1	Level 2	Grand Total
<b>WOODLAND PROJECTILE POINTS</b>			
Clarksville Small Triangular	2		2
Pee Dee Serrated	1		1
Caraway Triangular	3		3
Pee Dee Pentagonal	1		1
Roanoke Large Triangular	1		1
Triangular Preform	1		1
Randolf Stemmed	1		1
Randolph Stemmed	1		1
<b>LATE ARCHAIC</b>			
Savannah River Stemmed Base	1		1
Savannah River Stemmed Preform		1	1
<b>MIDDLE ARCHAIC</b>			
Halifax Side-Notched		1	1
Briar Creek Lanceolate	1		1
Rounded Base Guilford Lanceolate, Shouldered		1	1
Morrow Mountain II Stemmed	3		3
Morrow Mountain I Stemmed	1		1
Stanly Stemmed	1		1
<b>EARLY ARCHAIC</b>			
LeCroy Bifurcated Based	1	1	2
Big Sandy		1	1
Type I End Scraper		1	1
Type II End Scraper		1	1
Pointed Side Scraper		2	2
Type III Side Scraper	2		2
<b>Grand Total</b>	<b>21</b>	<b>9</b>	<b>30</b>

Finer scale vertical separation is not well illustrated in the shovel test data. The ceramic series vertical distributions, for instance, show no difference between the Early Woodland New River Series and the later Middle and Late Woodland series (Table 116). In fact, the data suggest that Hanover series ceramics might have a lower position than the earlier New River sherds. However, the more precise vertical control supplied by the test unit excavations indicates that there are subtle differences in the vertical positions of Early Woodland ceramics and later ceramic series

(Table 117). New River and Thom's Creek ceramics are more abundant below 20 cm bd, while Hanover and Cape Fear series ceramics occupy higher positions. Cape Fear and Hanover I ceramics were evenly distributed between 0 to 20 cm bd and 18 to 33 cm bd, while Hanover II series variants appear to be more abundant between 0 to 20 cm bd. Tentatively, this would suggest a sequence starting with Thom's Creek and New River series, followed by Cape Fear and Hanover I, and terminating with Hanover II. Given the associations of Middle and Late Woodland projectile point

Table 116. Vertical Distributions of Ceramic Series from Shovel Test Levels

Shovel Test Data Series	Level 1		Level 2		Level 3		Grand Total
	n	%	n	%	n	%	
Hanover I	88	75.9	28	24.1		0.0	116
Hanover Ic	5	83.3	1	16.7		0.0	6
Hanover II	297	83.2	57	16.0	3	0.8	357
Hanover IIc	1	100.0		0.0		0.0	1
Cape Fear	22	88.0	3	12.0		0.0	25
Yadkin Ia	4	100.0		0.0		0.0	4
New River	71	87.7	8	9.9	2	2.5	81
Grand Total	488		97		5		590

Table 117. Vertical Distributions of Ceramic Series from Test Unit Levels

Test Unit Data	Depth (cm bd)								Grand Total
	0-20		18-33		28-43		40-62		
	n	%	n	%	n	%	n	%	
Ceramic Series									
Hanover II	128	64.6	53	26.8	14	7.1	3	1.5	198
Hanover IId	8	100.0	0	0.0	0	0.0	0	0.0	8
Hanover I	77	47.8	64	39.8	17	10.6	3	1.9	161
Cape Fear	14	48.3	7	24.1	8	27.6	0	0.0	29
New River	53	24.2	133	60.7	30	13.7	3	1.4	219
Thom's Creek	0	0.0	1	50.0	1	50.0	0	0.0	2
Baked Clay Object	0	0.0	8	100.0	0	0.0	0	0.0	8
Grand Total	280	44.8	266	42.56	70	11.2	9	1.44	625



types with Hanover series pottery, then, it can be inferred that Hanover II is primarily associated with Late Woodland occupation, while Hanover I and Cape Fear ceramics are affiliated with Middle Woodland phases.

The diagnostic lithic tools from test units provide additional definition of the vertical position of occupations (Table 118). Woodland projectile points were almost exclusively recovered from the upper 20 cm of deposit. Two exceptions were noted, a Randolph Stemmed point inferred to be affiliated with the New River series was found at a depth of 20 to 30 cm bd and a Clarks-ville Small Triangular that is clearly intrusive into deposits at a depth of 30 to 40 cm bd. Middle Archaic point types were primarily found below

20 cm bd. Finally, a single Early Archaic point, a LeCroy Bifurcated Base, was recovered between 40 and 50 cm bd. A Type III side scraper was found at 20 to 30 cm bd and it is inferred to be associated with Early Archaic occupation. However, similar side scrapers are also commonly found in Middle Archaic assemblages.

A general vertical sequence emerges from this discussion. Middle and Late Woodland occupations occur between 0 and 20 cm bs and Early Woodland occupations occur slightly lower, at about 20 to 25 cm. Late Archaic materials appear to be centered between 20 and 30 cm, while Middle Archaic deposits occur between about 20

Table 118. Vertical Distributions of Lithic Diagnostics from Test Unit Levels

Test Unit Data	Depth (cm bd)				Grand Total
	0-20	20-30	30-40	40-50	
<b>WOODLAND</b>					
Clarks-ville Small Triangular	3		1		4
Unidentified Small Notched Triangular	1				1
Pee Dee Serrated	2				2
Caraway Triangular	3				2
Small Triangular	1				1
Medium Triangular	1				1
Pee Dee Pentagonal	4				4
Roanoke Large Triangular (Q1)	2				2
Randolph Stemmed		1			1
<b>MIDDLE ARCHAIC</b>					
Halifax Side-Notched				1	1
Round Base Guilford		2			2
Morrow Mountain II Stemmed		1			1
Morrow Mountain I Stemmed	1				1
<b>EARLY ARCHAIC</b>					
LeCroy Bifurcated Based				1	1
Type III Side Scraper		1			1
<b>Grand Total</b>	<b>18</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>25</b>

and 40 cm. Finally, Early Archaic occupations most commonly occur between 30 and 50 cm. Similar vertical sequences have been documented in South Carolina. Michie (1990) reports a generalized sequence that begins with Mississippian and Woodland materials in the upper 30 cm of sediment. This zone is underlain by ceramic Late Archaic occupations situated at 28 to 35 cm, Middle Archaic horizons at 35 to 55 cm, and Early Archaic corner-notched and side-notched components at 55 to 62 cm below ground surface.

Precisely how these cultural deposits are buried is a matter of some conjecture and controversy. Perhaps the central argument among geoarchaeologists and geomorphologists is the degree of deposition occurring on upland sandy surfaces across the Coastal Plain and Sandhills. Leigh (1998) and others (see Balek 2002; Bocek 1986; Johnson and Watson-Stegner 1990) view these surfaces as essentially stable, pre-Holocene-age sediments with only negligible evidence of Holocene accretional processes. They suggest that the process of bioturbation is primarily responsible for artifact burial of the type seen in these sandy deposits. Bioturbation involves the reworking of soils by biological agents such as tree roots, and soil fauna (i.e. ants, worms, gophers, etc.). Soil borrowing and small soil particle translocation from depths to the surface (i.e., ant hills, etc.) by soil fauna are credited with gradual burial of artifacts and the downward gravitational displacement of large surface objects (Balek 2002:43). Soil-turnover studies have documented sometimes extremely rapid translocation or mounding rates by various soil fauna. For instance, earthworms have been credited with adding as much as 0.25 to 0.5 cm yearly of fine sediments to the surface (see Balek 2002:45; Darwin 1896; Shaler 1891). Such rates are too extreme to explain the potential burial of 50 to 70 cm of cultural debris over the last 10,000 years at Fort Bragg, but it is clear that mounding at much slower rates could very well explain the vertical pattern of cultural deposits we

have described. However, Humphreys and Mitchell (1988) indicate that the activities of other soil fauna such as woodlice, snails, cicadas, beetles, and ants have much slower rates of turnover that would be more in line with the Fort Bragg vertical sequence.

The other main position taken on artifact burial on upland landforms is that it occurs through depositional processes. These include regional eolian deposition (see) and/or more localized processes such as colluviation and duning. That such processes operate in the region is agreed upon, only their significance in artifact burial is questioned. Leigh (1998) conducted grain size analysis at six upland prehistoric sites in Chesterfield County, South Carolina and concluded that all but one site was composed of fluvial or marine sediments of pre-Holocene age. Moreover, those sites with a complex soil structure consisting of a clayey Bt horizon underlying unconsolidated sands were apparently composed of a single parent material indicating a pedogenic development rather than a separate eolian origin of the unconsolidated sands. One site, however, appears to have originated from eolian sedimentation. Although Leigh suggests that the age of the upper soil mantle at this site is probably pre-Holocene in age, this could not be strongly demonstrated from the data collected.

Brooks et al. (1998) argue that large-scale eolian features occur across the Coastal Plain of the South Atlantic Slope. These consist of dunal sand sheets derived from major river valley alluvium. Most of these features are pre-Holocene in age. For example, the age of the Wateree River-to-Big Bay sand sheet in Sumter County, South Carolina is greater than 48,000 radiocarbon yr. BP (Gaiser et al. 2001). However, the surficial dunal topography associated with the sheet may have been active up until approximately 3,000 years ago. Based on the depths of archaeological deposits on the leading edge of the Big Bay

sand rim, Brooks et al. (2001) argue that Holocene reworking of sand sheet deposits through localized eolian redeposition occurred as a series of punctuated periods of stability and rapid burial. Post-3,000 BP sediment accretion was primarily attributed to anthropogenically-induced slope-wash.

Some recent geoarchaeological investigations in North Carolina have argued for an eolian origin for artifact burial on upland sand hill and coastal plain ridges. Seramur and Cowan (2003) have argued from grain size analysis of stratigraphic samples taken at site 31MR205 that unconsolidated sandy deposits resting on older marine and alluvial terraces in Moore County originate from localized eolian dune deposition derived from streambeds in much the same way as described by Brooks et al. (1998). On this site the unconsolidated Pinehurst Formation sands rest on Pinehurst alluvial gravels, which in turn overlie marine mud of the Cape Fear Formation. They suggest that during periods of draught, alluvial sands and finer particles are blown upslope across ridges by prevailing southwest-northeast winds. The finer particles are transported away from the immediate area, but the medium sized sand particles move small distances upslope onto the ridges. Under these conditions, the southwest slopes are eroded, while accretionary deposition occurs on the tops and northeast slopes of the ridges.

In support of this model Seramur and Cowan (2003) note that two concave depressions or blow-outs were observed along the southwest slope of the ridge supporting 31MR205 and that the Pinehurst sands are much thicker on the northeast side of the ridge where higher sediment accumulation would be expected. Moreover, assumed pene-contemporaneous cultural deposits on the northeast slope were approximately 10 cm deeper in the deposit (25-30 cm vs. 35-40 cm) on the northeast slope. They argue that this difference

is consistent with an eolian deposition model and not bioturbation, which would predict similar depths of contemporaneous cultural deposits.

Bioturbated mounding and eolian deposition may both operate to produce the kind of vertical separation of cultural deposits seen in Sandhill and Coastal Plain upland ridges. Whether this separation occurs because of subtle subsidence or local, small-scale depositional events, however, does not seem to impact our ability to isolate discrete occupational events and to reconstruct the organization of such occupations as this information is clearly preserved on Fort Bragg and in other regions on the South Atlantic Slope. Not only are the spatial relationships between activity zones within individual occupations preserved, but also features such as rock clusters retain their aggregated structure (see Cable et al. 1998:160-170). Moreover, perishable material such as small bone fragments retain their horizontal and vertical relationships with tool clusters in what appear to be former hearth zones (see Cable et al. 1998:362-363). However, if it can be demonstrated that eolian deposition events were occurring at specific periods, then this would be of interest to paleo-climate reconstructions of the Holocene and potentially provide valuable ecological data for understanding prehistoric adaptive systems.

Future geoarchaeological studies should focus on three factors. First, the significance of grain size patterns of sediments should be better addressed. There is disagreement at present about the threshold of grain sizes that can be moved by winds. Moreover, the grain size profile models must be evaluated within the context of local dunal patterns of deposition instead of regional, loess-based profiles. Second, detailed topographic mapping should be undertaken to identify and evaluate subtle geomorphic features such as "blow-out" concavities or alluvial fan features that might be used to confirm the former operation of depositional processes that may

have contributed to artifact burial. Topographic mapping must also be conducted at depth in soil profiles to develop an evolutionary model of relevant landforms. This latter endeavor should be conducted by systematic sampling at much higher sample intensity than is usually done during traditional geomorphological investigations. Finally, detailed vertical distributional data for specific phases should be undertaken to more effectively evaluate variable sedimentation rates. This will provide information relevant to evaluating eolian deposition models, but also can begin to supply the information necessary to date depositional events if they did in fact occur. Radiocarbon dating of cultural features (see Seramur 2004) and other soil dating techniques (see Forman and Pierson 2002; Frink 1994) may also be applicable to building a chronology of depositional events.

## CULTURE HISTORIC SEQUENCE

A large number of Woodland period projectile points were recovered during test excavations and these can be arranged in a tentative sequence and compared to the ceramic series sequence for the Sandhills developed by Herbert (2003; see Figure 165). Six different point styles were identified. In chronological order from earliest to latest these are Randolph Stemmed, Roanoke Large Triangular, Pee Dee Pentagonal, Caraway Triangular, Pee Dee Triangular/Serrated, and Clarksville Small Triangular.

Although Coe (1964; 1995) argued that the Randolph Stemmed type dated to the historic period, its size and morphology are more consistent with an Early Woodland affiliation. Nearby correlates would be the Swannanoa Stemmed (Keel 1976:196-198) and the Plott Short Stemmed (Keel 1976:126-127) types of the Appalachian Summit region of western North Carolina. The former point type is associated with the heavily tempered (crushed quartz and coarse sand) Swan-

noa series fabric-impressed and cord-marked ceramics, which correlate with the New River series of the Sandhills. From this it is inferred that the Randolph Stemmed type is associated with the New River series. It is further surmised that the Randolph Stemmed type was derived from the Otarre Stemmed type (see Keel 1976:194-196), which is associated with Thom's Creek series ceramics in South Carolina (see Trinkley 1980).

Three large triangular points with slightly concave bases were recovered during test excavations and were classified as Roanoke Large Triangular (Coe 1964:110-111). This classification was preferred over that of Yadkin Large Triangular (Coe 1964:45-49) because the latter type consists of forms containing both slightly and extremely concave bases. We recommend that the application of the Yadkin Large Triangular type be reserved only for the extremely concave forms to clarify the two modes of morphological variation. Both of these types are considered Middle Woodland affiliates and are associated with pottery series characterized by medium to coarse sand (Clements series) and crushed quartz (Yadkin series). In the Sandhills region of Fort Bragg, it may be inferred that the type has a primary association with Cape Fear series ceramics.

The Pee Dee Pentagonal type was first described from the Doerschuk Site excavations (Coe 1964:49). Coe suggested that the type was historic in age, but more recently he (1995:200) lowered his age estimate to ca. A. D. 1000 and identified an elongated variant referred to as the Yadkin Eccentric. However, the large size of the point and its morphological similarities to the Nolichucky (Cambron and Hulse 1969, 1975) and Copena points of the Mid-continent strongly suggest that the style dates to the Middle Woodland period, sometime between A. D. 1 and 800. Roanoke Large Triangular and Pee Dee Pentagonal points occur in relative abundance and at close proximity from one another at 31CD898 and



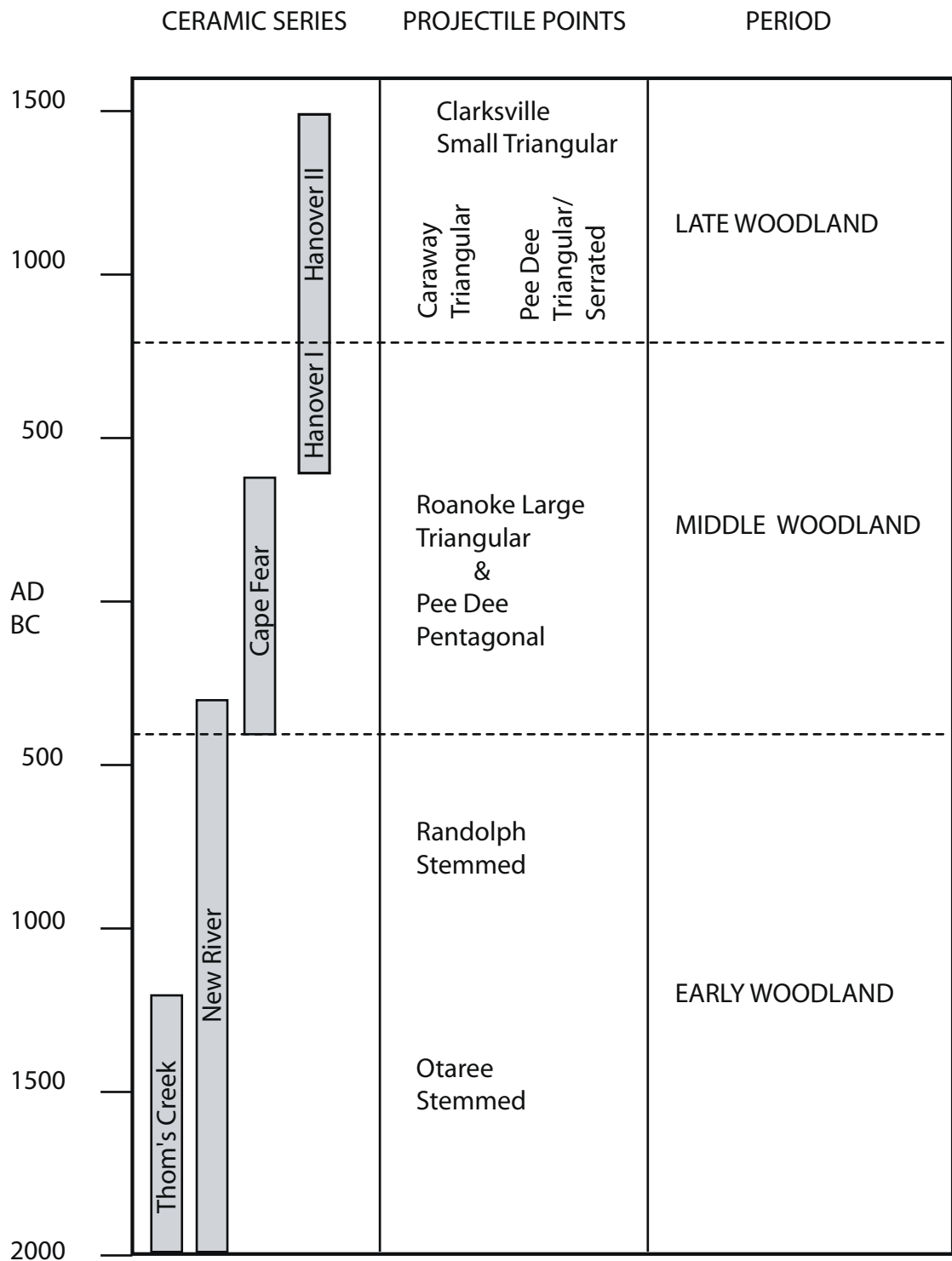


Figure 165. Correlation of Major Sandhills Ceramic Series (Herbert 2003) and Woodland Projectile Point Types

31CD913 in the DO1 testing package, which may indicate that their temporal ranges overlap.

The Caraway Triangular type is a medium sized triangular projectile point ranging from equilateral (broad form variant) to elongate isosceles (narrow form variant) (see Coe 1995:204-205) outlines. Blade edges range from slightly incurved to slightly excurvate. Coe (1964:49) suggested that the type dates to ca A. D. 1600 and was associated with Proto-historic Siouan groups, but the modern consensus, armed with better and more numerous independent dating assays, is that the later ends of his cultural sequences are too recently calibrated. Similar medium-sized triangular points are associated with Late Woodland and Mississippian sites dating from A. D. 900 to 1400 throughout the South Appalachian area. Moreover, the type is the clear dominant at the Town Creek mound site in the upper Great Pee Dee River Valley, which dates to the period ca. A. D. 1100 to 1400 (see Coe 1995). In addition, Connestee and Haywood Triangular styles of similar morphology occur in the Late Woodland pre-mound deposits at the Garden Creek site on the Pigeon River (Keel 1976:131-132). Other regional correlates in the Mid-continent and Northeast would include Madison, Fort Ancient, Levanna, and Hamilton Incurvate points (see Justice 1987:224-230). Based on this correlation, it would appear that the Caraway Triangular is primarily associated with the Hanover ceramic series in the North Carolina Sandhills.

A point style that may be partly contemporaneous with the Caraway Triangular is the Pee Dee Triangular/Serrated type. This is a small, well-made triangular point typically with incurvate blade margins similar in morphology to the Late Woodland Hamilton Incurvate type of the Mid-continent (Lewis and Kneberg 1946:110-111). Serrated blade edges and extremely concave bases are commonly found in the type. Coe (1995:202-203) placed the temporal position of

the type at ca. 1300 and it may well have ranged over the same time span as the Caraway Triangular. There is some evidence to suggest that the Hamilton Incurvate point had a ceremonial significance as it was many times found as funerary offerings in burials on Hiwassee Island in Tennessee (Lewis and Kneberg (1946:110-111). The Pee Dee Triangular may have functioned similarly in the ritual systems of Late Woodland and Mississippian groups in North Carolina. In the Sandhills this form, too, is probably associated with Hanover ceramics.

The Clarksville Small Triangular point was described by Coe (1964:112) from the excavations at the Gaston Site. It is a very small triangular point with equilateral sides and straight to convex blade margins. Although Coe described the point as well made and symmetrical, there is a tendency for them to be more crudely fashioned than Caraway and Pee Dee triangular points. Points of this type are commonly found in Proto-historic and Historic contexts throughout the Southeast (see Cable et al. 1997). A nearby correlate is the “petite” variant of the Hillsboro Triangular point, which is commonly found in Proto-historic and Historic Siouan sites in the Piedmont of North Carolina (Coe 1995:206; Dickens et al. 1987).

Since the only basis to distinguish Caraway Triangular and Clarksville Small Triangular types is through size sorting, there is some potential for misclassification. For instance, Figure 43, Row B in Coe (1964:48) illustrates a line of points classified as Caraway Triangular points at the Doerschuk Site, but the ones on either end are smaller and Coe (1964:49) indicated that they more closely resembled the northern Piedmont Clarksville-Hillsboro continuum. Based on the ceramic sequence established for the Sandhills region, it would appear that this type might also be associated with Hanover series ceramics. At 31CD898, where are large number of Clarks-

ville Small Triangular points were recovered, for instance, abundant Hanover series ceramics were recovered in the absence of the identification of a viable sand-tempered series that might be affiliated with a Proto-historic occupation resembling that reported for the Occaneechi site cluster on the Eno River (see Davis 1987). However, there is some potential for such a series to be misclassified as Cape Fear in the region and as such, the ceramic associations of the Clarksville Small Triangular must be viewed as poorly known at present.

The recovered ceramics from the project mirror closely the sequence composition described by Herbert (2003) and very little new information was generated at the level of the regional sequence. However, there are degrees of morphological and technological variation in the various series that may ultimately provide a basis for delineating a detailed phase sequence. The salient characteristics of the variation in the project collection were preserved through the creation of series variants. What is needed in the future are sealed feature contexts to seriate this variation into a better-defined sequence through classification and independent dating assays.

The Archaic projectile points recovered during testing fit easily into the North Carolina sequence. Of special note is the recovery of three bifurcate projectile points, two of which were classified as LeCroy Bifurcated Stem and one of which was typed as a St. Albans Side-Notched. Although the bifurcate tradition is geographically centered along the Appalachian Mountain chain in Tennessee and West Virginia (Broyles 1966:23-27, 1969; Chapman 1976), examples of this tradition occur over a broad area of North Carolina (see Claggett and Cable 1982; Coe 1995). In addition to this project, surveys conducted at Fort Bragg have also identified bifurcated points (Benson 1998; Clement et al. 1997). An issue that is not entirely resolved is whether these points represent

an intrusion of the bifurcate tradition into the area or represent natural development within the local point sequence. The problem arises from their apparent absence from the Hardaway site, which moved Coe (1964:121) to construct a sequence of point styles in which Kirk Stemmed and Serrated types directly arose from the Palmer Corner-Notched type. There is reason to believe, however, that the bifurcate styles actually bridge the transition between the former point types. Chapman's (1985) excavations in the lower Tennessee River Valley indicate that bifurcate tradition styles occupied a stratigraphic position between Palmer/Kirk Corner-Notched and Kirk Stemmed/Serrated. Chronometric data further placed this stratigraphic interval between about 6900 and 6300 BC. It is therefore recommended that the bifurcate styles be incorporated as evolved styles within the local projectile point sequence.

## OCCUPATION TYPES AND SETTLEMENT SYSTEMS

The results of the DOI testing project, along with numerous other survey and testing projects, reveal that the archaeological record of the Fort Bragg region is comprised of virtually hundreds of small, ephemeral campsites that were formed over thousands of years. The fact that the record appears as a series of archaeological sites distributed across the landscape masks the reality that each site consists of numerous, most often unrelated occupations by small, hunter-gatherer groups. Such sites pose special and difficult challenges for all aspects of cultural resource management because they generally do not exhibit large-scale spatial organization of activity zones as one would encounter with villages where there are often discrete locations for residences, mortuary features, secondary refuse deposits, ceremonial functions, and public sectors. Instead, most sites in the region are composed of a complex and redundant array of special purpose camps, extrac-

tion loci, single nuclear family and small multiple family short-term residences that are seemingly distributed independently and randomly from one another.

The first step in reconstructing settlement patterns under these circumstances is to identify occupation types. Our investigations confirm that the range of types in the Fort Bragg area is consistent with those identified in the South Carolina Coastal Plain (see Cable and Cantley 1998; Cable et al. 1998; Cantley and Cable 2002). Basic elements consist of partial vessel clusters, debitage concentrations, tool clusters, diffuse debitage scatters, and isolated tools. These elements combine to create a series of generalized site types.

What we consider the nuclear residential unit consists of a debitage concentration and an associated tool cluster situated at a location along the periphery of the concentration. It is inferred that the tool cluster represents the approximate location of a former hearth. It is also believed that ephemeral shelters were situated adjacent to these tool clusters and opposite the debitage concentration, although firm evidence of such structures has not been recognized to date. The debitage concentrations represent lithic reduction loci established away from the shelter or sleeping area for manufacturing tools during the stay at the camp. This site type occurs in both Archaic and Woodland occupations. In the latter, an additional element is included, the partial vessel cluster. In general, these clusters do not appear to have ever represented an entire vessel, but rather appear to be curated and cached vessel fragments that were used perhaps as parching trays, serving platters, digging implements, and/or some other unspecified function. Since they occur in a spatially opposed position to the debitage concentrations and adjacent to tool clusters it is inferred that they indicate the former locations of shelters where they were stored and used during the occupation and where they were cached for reuse during

subsequent re-occupations of the camp. There is clear evidence of pottery manufacture on some of the project sites, however, and it is probable that these partial vessels began as whole pots but through time were broken and recycled. If true, we would expect few whole pots to be recovered in the archaeological record as seems to be the case. This residential site type conforms well to the structure and organization of !Kung nuclear family huts (see Figure 3-3; Yellen 1977) and it is therefore inferred that they represent similar nuclear family residences associated with foraging activities. These occupations tend to range between 9 m<sup>2</sup> and 30 m<sup>2</sup> in area.

Another basic occupation type is what appear to be specialized camps established by task groups rather than nuclear family units. These consist of diffuse tool and debitage scatters with very little spatial organization and coherence. Although camps of this sort can be comprised of females and their offspring, the most commonly reported ethnographic cases relate to male hunting parties. Hayden (1979b:151-164) provides us with an example of a short-term camp from his ethnoarchaeological work among the Pintupi of the Western Desert of Australia. Hayden excavated some recently abandoned special purpose camps and interpreted the results with the aid of the informants who actually occupied the sites. One of these camps, Walukaritji, is illustrated in Figure 166. Here, two diffuse artifact scatters were identified within a 10-x-10-m excavation block. The scatter in the upper corner of the plan was created by two adult males who erected a windbreak and slept in a small area of approximately 1 x 2 m directly behind it. Over the 3-week period in which the camp was occupied, these two men made several hearths for warmth, cooking, and repelling flies and produced a debris scatter measuring ca. 4 x 5 m. The scatter in the lower portion of the plan was produced by three younger, classificatory bothers. The debris scatter from this occupation measured about 4 x 4 m



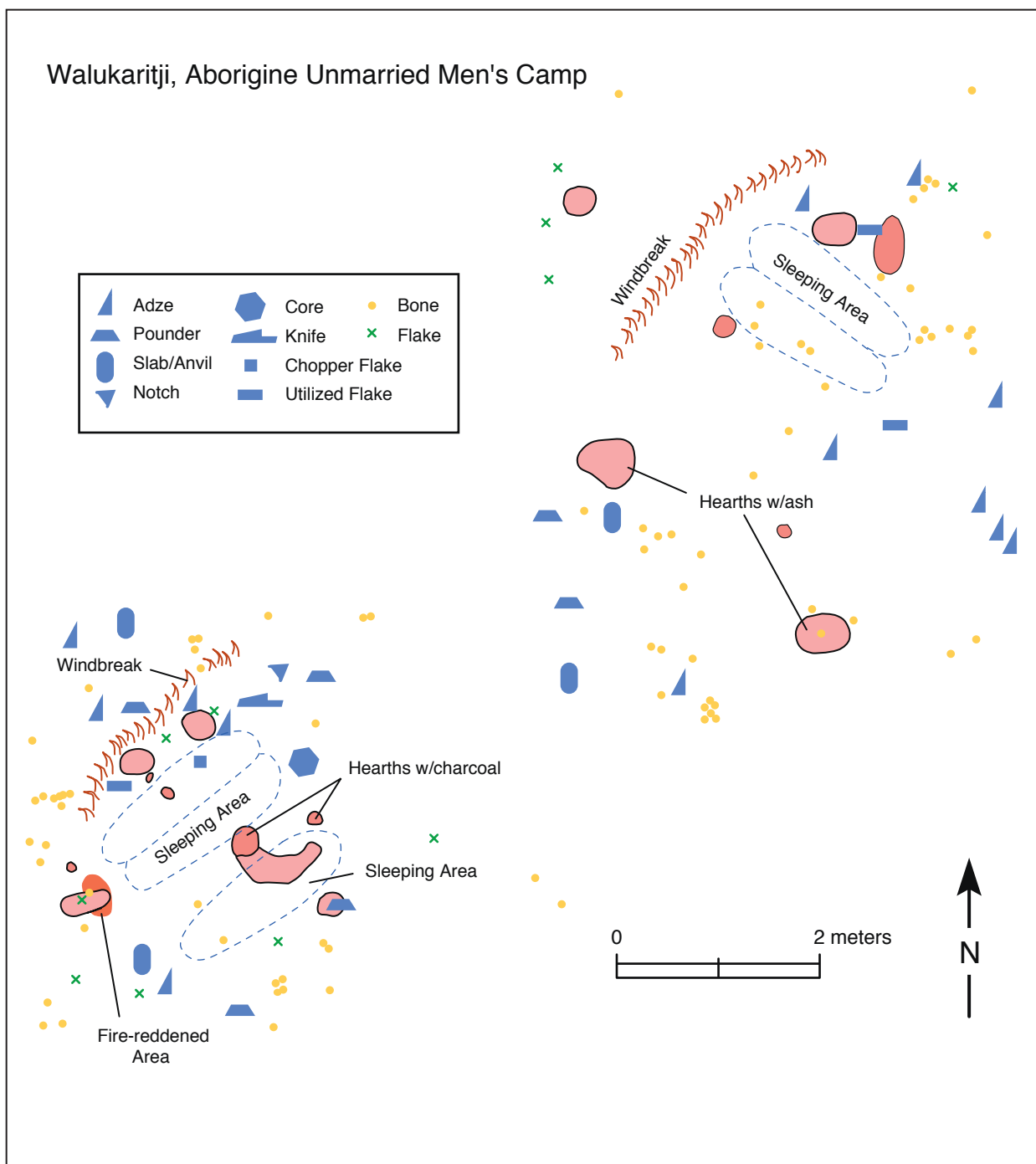


Figure 166. Representation of Walukaritji Unmarried Men's Camp (Hayden 1979)

and the sleeping area was again situated near the center.

An interesting contrast between the !Kung site plans and the Pintupi unmarried men's camp is the dominance of discarded tools in the latter. Clearly the two cases are not directly comparable because the !Kung did not rely on stone tool technology and we can surmise that tool discard rates were much different. Most of the discarded tools at Walukaritji were expediently fashioned and manufactured from stone obtained from nearby

sources; both conditions that would favor rapid discard rates. Nevertheless, specialized camps represent just the kind of conditions in which we can expect to find naturally high discard rates given the demands of redundant and intensive processing activities that generally occur at such sites.

The best examples of this occupation type in the South Carolina samples are associated with the Paleoindian and Early Archaic periods and may represent male hunting camps (see Figure

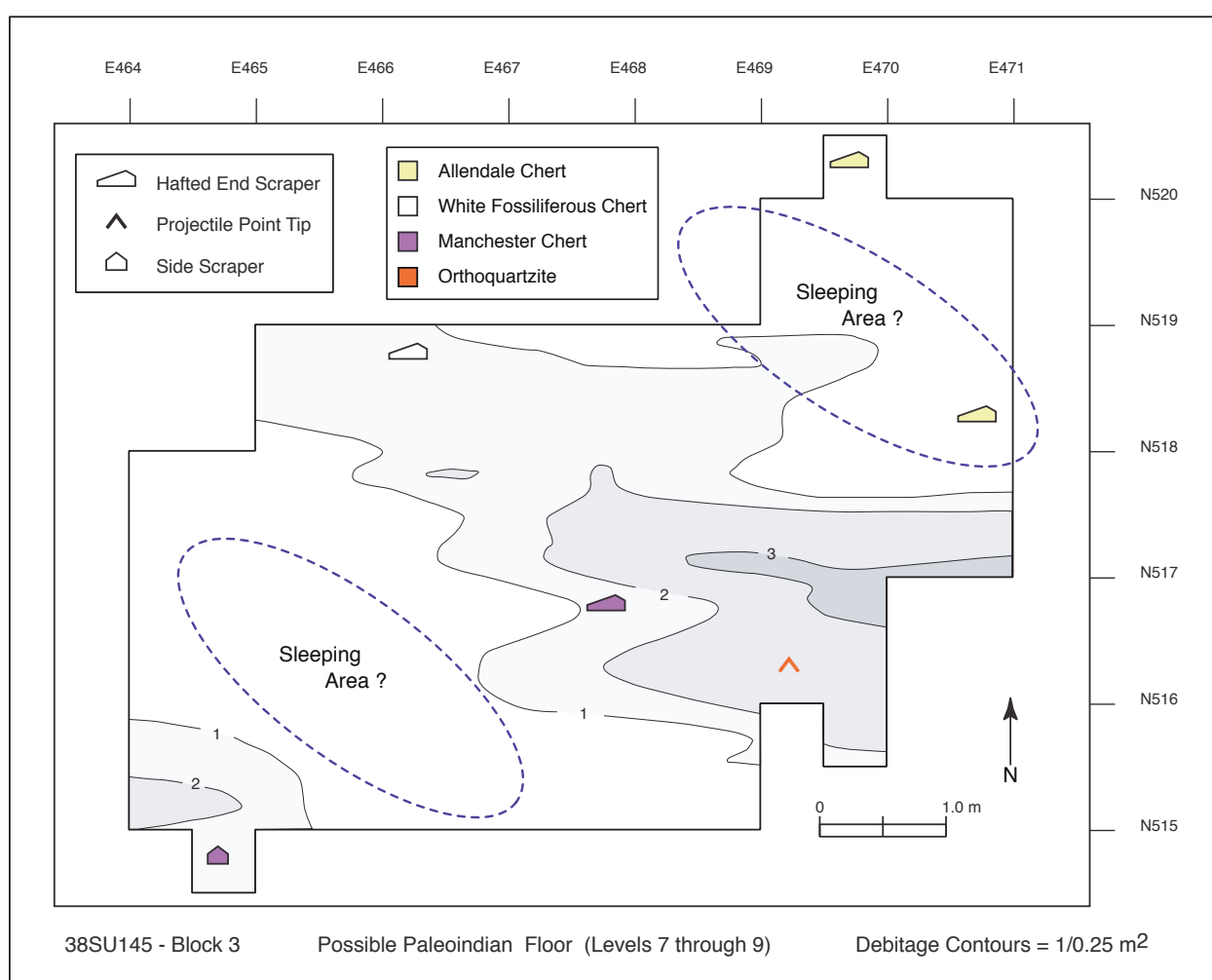


Figure 167. Example of Logistical Camp Excavated in Sumter County, SC (Cable and Cantley 1998)

167). They exhibit high tool to debitage ratios and non-concentrated and diffuse tool distributions. The lack of debitage concentrations suggests that tool manufacture was not undertaken. Instead, highly targeted activities were performed in which finished tools were brought to a location in anticipation of specific uses. Debitage consisted exclusively of small, late stage reduction residue and resharpening spalls, evidencing a dominance of maintenance activities. Discarded tools in these sites generally include end scrapers, suggesting that the camps were the loci of deer skinning and perhaps butchered meat part processing in preparation for transport to a base camp. The voids between artifact scatters resemble the sleeping areas Hayden described for Walikariti and may have served similar functions. Many of the diffuse debitage scatters and isolated tools identified during the testing project may represent similar occupation types. Other types of low-density refuse deposits associated with extraction and processing activities rather than camps may be present in the archaeological record of the region as well. Unfortunately, low-density scatters cannot be easily defined at the level of sampling available for testing projects, but their identification and definition are critical to understanding settlement variability.

A complicating factor arises when one or more of these elemental occupation types co-occur in a single occupation. The most fundamental composite type is the multi-family residential camp. Short-term camps of this type may simply consist of a cluster of residential household elements like the Shum !Kau 3 multi-family residence (see Figure 168) described for the !Kung (Yellen 1977). Here, six households, five nuclear families and one lone adult, established six huts and camped for a period of six days. The primary debris scatter encompassed an area measuring 10 x 19 m. A haphazard circular arrangement of huts can be discerned, but no communal or extra-mural activity zones were established.

Debris accumulations in the Bushmen camps Yellen described can be classified archaeologically as primary refuse, that is, refuse discarded at its location of use (Schiffer 1976:30). In situations where camps are occupied for longer periods of time, however, it becomes advantageous to keep activity areas around hearths cleared of debris, either by tossing or transporting garbage into rubbish piles or secondary refuse zones (see Hitchcock 1987). The Efe of the central African rainforest, for instance, occupied their camps for periods of several months and to maintain comminution paths in the central portion of the settlement they piled garbage along the perimeter of their circle of huts (Figure 169). Other than refuse distributions, however, the arrangement and size of Efe multi-household camps are nearly identical to that of the Bushmen camps. The Efe camp measured 8 x 15 m and encompassed an area of ca. 120 m<sup>2</sup>. Efe camps in Fischer and Strickland's (1991:220) sample ranged from 44 to 532 square meters. Yellen's (1977) sample of !Kung camps exhibited a similar range (38 to 378 square meters) for what he referred to as the LMS (limit of most scatter), or the area within which the preponderance of discarded artifacts accumulated.

Some difficulty arises when attempting to identify composite occupations in archaeological contexts. First, contiguous exposures of this size are only rarely excavated on sites during mitigation efforts. Second, it is not always possible to establish continuity between household elements in a suspected array. Third, multiple-household arrangements are not always regularized and may not be easily recognized by spatial pattern analysis. Nevertheless, developing methods to identify supra-household occupations is critical to understanding settlement patterns and the processes of household and social evolution as these relate to the organization and functioning of larger social units.

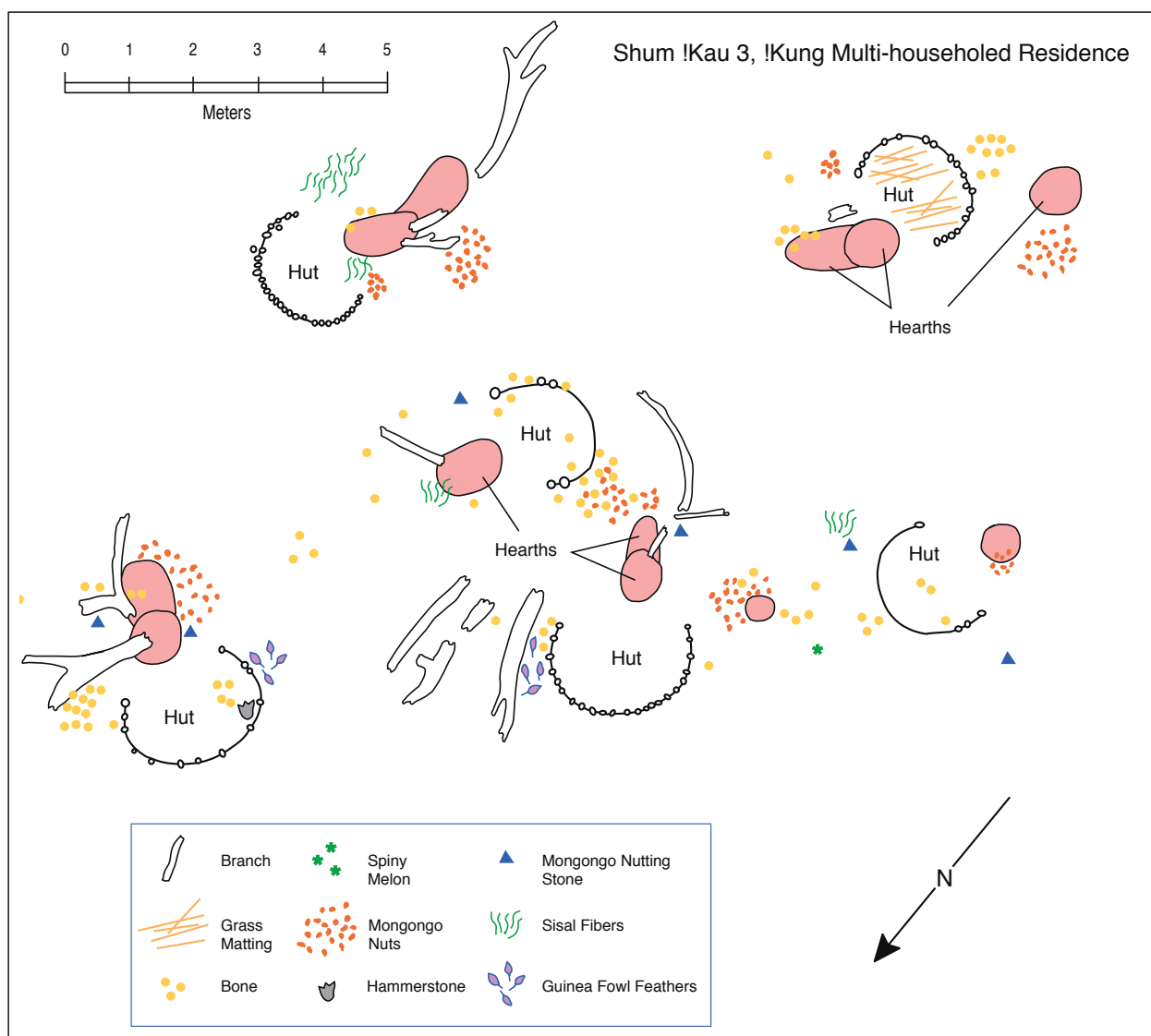


Figure 168. A Bushmen Multi-Household Camp (Yellen 1977)

We have demonstrated that hundreds of occupations generally structured as described above exist in the DO1 prehistoric site sample. In most instances, however, we did not achieve sufficient sample density to generate rigorous models of occupation types. Given the fact that most of the occupations cover areas of less than 6 m in diameter, sufficient sample density is not achieved until shovel test intervals of 1.25 m are established around a debris scatter. This yields

probability samples of 4 to 6 percent, varying by the goodness of fit between the sample grid and the shape of individual scatters. Above this density, very few sample points occur within the effective area of an occupation. Only four sites within the DO1 package received sampling at this intensity and they yielded 19 occupations and/or occupation elements of sufficient definition to contribute to a discussion of occupation types (Table 119).



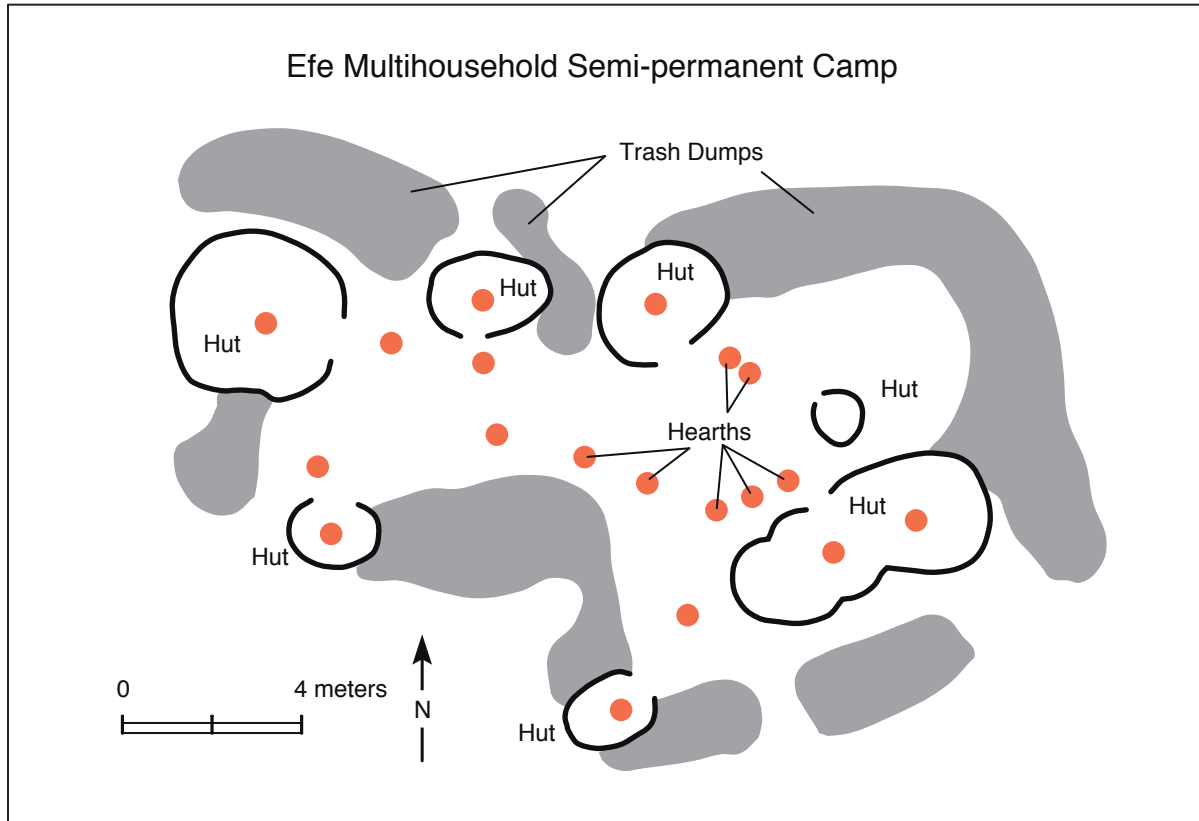


Figure 169. Efe Multi-Household Seasonal Settlement (Fischer and Strickland 1991)

Most of these are what we assume represent residential camps and range between about 9 m<sup>2</sup> and 35 m<sup>2</sup> in size. Sample fractions (the percentage of the area of an occupation that was excavated) range between 4.0 and 36.3 percent, with larger fractions including test unit excavations as well as shovel tests. Logistical camp/station types are less well represented owing to their lower archaeological visibility.

The residential camps typically consist of debitage concentrations, which are supplemented by ceramic concentrations for Woodland period occupations. Tool clusters were found with six of the camps, but we can assume that they are associated with all, or nearly all, of the camps. The debitage concentrations, which all appear

to represent biface reduction, are not monolithic in composition (Table 120). This variability is probably due to a number of factors, including core preparation, intended finished tool sizes, core sizes, and the cryptocrystalline and hardness properties of individual raw material types. One clear pattern is revealed by the projected amount of debitage associated with the concentrations. Most are projected to contain between 100 and 600 pieces of debitage, while three contain frequency projections of about 1,000. Similar patterns are reflected in the weighted debitage density means calculated for clusters in Table 119. The latter grouping may represent multiple core reduction episodes, while the former may record the by-products of single cores. The Morrow Mountain I camp has a high percentage of cortex

Table 119. Occupation Types from Sampled Deposits

Site	Occupation ID	Occupation Type	Sample Block	Sample Fraction <sup>1</sup>	Cultural Association	Size <sup>2</sup>	Debitage Concentration	Weighted Debitage Density (per 1 m <sup>3</sup> )	Tool Cluster	Ceramic Concentration	Rock Concentration	Pit
31CD810	CD810.1	Residential	SB1	36.3	Hanover II	3 x 5 m	x (Q5)	1.67		x		
31CD810	CD810.2	Residential	SB1	13.3	Archaic?	3 x 5 m	x (R5)	7.53			x	?
31CD810	CD810.3	Logistical	SB1	?	Guilford	1 x 1 m			x			
31CD810	CD810.4	Residential	SB2	24.4	Early Archaic	4 x 4 m	x (Q1)	21.00	x			
31CD810	CD810.5	Residential	SB2	?	Hanover II	?				x		
31CD810	CD810.6	Logistical	SB3	24.4	Early Archaic	?						
31CD810	CD810.7	Residential	SB3	8.7	?	5 x 5 m	x (Metasiltstone)	18.84				
31HK1094	HK1094.1	Residential, Multiple?	SB2	16.6	Savannah River	5 x 6 m	x (R9)	41.77	x			
31HK1094	HK1094.2	Residential, Multiple?	SB2	17.1	Savannah River	3 x 6 m	x (R3)	19.89	x			
31HK1126	HK1126.1	Residential	SB1	5.0	Archaic	3 x 3 m	x (R13)	26.67				
31HK1126	HK1126.2	Residential	SB1	6.0	Archaic	3 x 5 m	x (R2)	13.33				
31HK1126	HK1126.3	Residential	SB1	15.1	Archaic	3 x 4 m	x (R8)	12.17				
31HK1126	HK1126.4	Residential	SB1	33.3	Archaic	3 x 5 m	x (R8)	37.87				
31HK1126	HK1126.5	Residential	SB1	8.1	Stanly?	3 x 6 m	x (R7)	12.22	x			
31HK1126	HK1126.6	Residential	SB3	15.5	Morrow Mountain I	5 x 7 m	x (R7)	77.43	x			
31HK1142	HK1142.1	Residential	SB1	20.8	Archaic	4 x 6 m	x (R3)	184.88				
31HK1142	HK1142.2	Residential	SB1	4.0	Archaic	3 x 3 m	x (R11)	16.67				
31HK1142	HK1142.3	Residential	SB1	15.0	Archaic	4 x 8 m	x (R8)	10.81				

1- Sample Fraction: Percentage of Excavated Area Relative to Size of Occupation Cluster

2- Size: Size of occupation as estimated from grid-based contour algorithm as discussed in Chapter 3

3- Weighted Debitage Mean Density: Weighted Mean of Debitage Density as discussed in Chapter 3

Table 120. Properties of Debitage Concentrations

Site	Occupation ID	Raw Mat	Association	Size Class Distributions								Grand Total	Projected	%Cortex
				Frequency				Cumulative Percentage						
				1 to 2	3	4	5 to 7	1 to 2	3	4	5 to 7			
31CD810	CD810.1	Q5	Hanover II	2	5	2						9	25	0
31CD810	CD810.2	R5	Archaic ?	5	6	3	1					15	113	0
31CD810	CD810.4	Q1	Early Archaic	36	27	8	11	43.9	76.8	86.6	100	82	336	0
31CD810	CD810.7	Metasiltstone	?	14	11	13	3	34.1	61	92.7	100	41	471	0
31HK1094	HK1094.1	R9	Savannah River	112	45	25	25	54.1	75.5	100		207	1253	0
31HK1094	HK1094.2	R3	Savannah River	27	18	11	4	45	75	100		59	358	0
31HK1126	HK1126.1	R13	Archaic	6	2	2	2					12	240	0
31HK1126	HK1126.2	R2	Archaic	4	6		2					12	200	0
31HK1126	HK1126.3	R8	Archaic	14	4	4		63.6	81.8	100		22	146	4.6
31HK1126	HK1126.4	R8	Archaic	102	64	18	5	54	87.8	97.4	100	189	568	2.7
31HK1126	HK1126.5	R7	Stanly?	5	6							11	220	0
31HK1126	HK1126.6	R7	Morrow Mountain I	144	153	96	27	34.3	70.7	93.6	100	420	2710	4.8
31HK1142	HK1142.1	R3	Archaic	453	330	118	22	49.1	84.8	97.6	100	923	4437	0
31HK1142	HK1142.2	R11	Archaic	4	1		1					6	150	0
31HK1142	HK1142.3	R8	Archaic	28	19	5		53.8	90.4	100		52	346	0

as well as large amounts ofdebitage, suggesting the reduction of multiple unmodified cores. Of interest here is that the cores would have been composed of the same raw material (R7). Most of the concentrations, however, contain little or no cortex and they are more appropriately considered the by-products of prepared core reduction. Relatively high cortex counts were found with R7 and R8 metavolcanic subtypes, suggesting that these may have been procured locally from terrace deposits.

Debitage size class distributions, moreover, indicate two groupings of assemblages, those containing 25 to 30 percentdebitage of Size Class 4 or larger and those that consist of 85 to 90 percent Size Class 3 or below. The former group evidences the production of biface preforms such as the rejected ends found with the Morrow Mountain I camp and the Savannah River preform reject associated with 31HK1094.2. The latter group, by contrast, indicates the manufacture of smaller, single cores. Over time, additions to this database may begin to reveal culture historic differences in raw material procurement strategies.

Most of the residential camps defined through close interval shovel testing appear to represent isolated, single family occupations. One possible exception to this rule is the two Savannah River occupations/elements identified at 31HK1094 (see Figure 138). Here,debitage concentrations of R3 and R9 subtypes share the same physical location and two tool clusters ring the perimeter of the concentrations on the north and south. The north cluster is represented by a Savannah River Stemmed base of R3, while the southern cluster consists of a Savannah River Stemmed preform and a flake tool, both of which are comprised of the R9 subtype. Although the co-spatial association of thedebitage concentrations may simply be coincidental and therefore each may represent output from separate occupations, the overall spatial pattern of elements is also consistent with what might be expected of a multiple-household occupation of two nuclear families.

The Woodland period occupations at 31CD913, 31CD924, 31CD927, and 31CD898 appear to have the potential to contain larger mul-

multiple-household occupations, but this could not be determined from the small samples of individual elements recovered. The individual deposits suggest nuclear family residences, but larger community patterns that might provide evidence for multi-family occupations are not yet linked from the testing data. That some of the occupations probably lasted more than just several days is evidenced by the recovery of accidentally fired Hanover series ceramic coils and fillets at 31CD810 and 31CD913, suggesting that pottery manufacture may have been common and wide spread during at least the Middle and Late Woodland periods in the region. Clearly, pottery manufacture would indicate longer-term settlements, perhaps on the order of an entire or partial season. It is assumed that intensive foraging was being undertaken as a chief economic strategy on these sites, but it may also be learned through special soil sample analyses that horticultural activities directed toward inchoate cultivars or, later, also imported domesticated plant species were also deployed. In this regard, the swampy soils of the upper creek heads may have provided an opportune microenvironment to grow certain of the Eastern Agricultural Complex (Ford 1985:347-349) seed crops such as sunflower (*Helianthus annuus*) sumpweed (*Iva annua* var. *macrocarpa*), goosefoot (*Chenopodium bushianum*), maygrass (*Phalaris caroliniana*), knotweed (*Polygnum erectum* L.), little barley (*Hordeum pusillum* Nutt.), and giant ragweed (*Ambrosia trifida*). In particular, this may be the case for the upper creek heads on the eastern side of the Fort, where gradients are not as extreme and swamp formations are more extensive. Woodland occupations also occur in the upper creek heads on the western side of the Fort, but here they are found in much lower densities and are generally expressed as isolated residences.

## FINAL COMMENTS

Although the prehistoric occupations identified in the DO1 site sample are simple and basic, the problem of settlement reconstruction is made complex by the apparent disconnected nature of the deposits. As a consequence, our ability to develop a predictive model to first identify the occupation types and their cultural associations and then to generate reliable statistical estimates of their densities within microenvironments and sub-geographic regions is severely restricted. We have shown just how labor intensive and serendipitous it can be to identify the cultural associations of discrete occupations, even after they have been circumscribed by sampling. This is due to their short-term nature, which generally results in low diagnostic tool discard probabilities. If these basic associations cannot be rigorously described, it becomes nearly impossible to sufficiently reconstruct settlement patterns in the region.

Traditional approaches to cultural resource management, however, fail to accommodate these data needs into the regular process of site evaluation. Under this approach, there is little concern for the information content of sites that are ultimately evaluated not eligible for inclusion on the NRHP. Sites that are evaluated ineligible are those that do not contain significant research values under criterion d. The logic is convenient, but does not fully address the problem. All of the sites we have tested have retained sufficient integrity to yield information on settlement system reconstruction. What we don't know is whether the information that a site contains is redundant relative to the current sample of sites or not. The main thrust of our work on this project has been to explore methodological approaches that can be used to build a regional database sufficient in its rigor and scope to develop regional models of settlement.





# References Cited

- Abbott, L. E., Jr.  
1998 Personal Communication to C. E. Cantley.
- Abbott, L. E. Jr., C. E. Cantley, and S. Jones  
2001 A Reevaluation of Quartz and Silicate Raw Material Acquisition Along the South Atlantic Slope: Going Beyond the Economics of Expediency. Paper presented to the 66th Annual Meeting of the Society For American Archaeology, April 18-22, 2001, New Orleans, Louisiana.
- Abbott, L. E., and M. Harmon  
1998 The Acquisition of Siliceous Raw Materials from the Carolina Slate Belt: Intentional or Fortuitous Lithic Procurement within the South Central Piedmont of North Carolina. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle.
- Adovasio, J. M., J. Donahue, and R. Stuckenrath  
1990 The Meadowcroft Rockshelter Radiocarbon Chronology 1975-1990. *American Antiquity* 55:348-354.
- Adovasio, J.M., J.D. Gunn, J. Donahue and R. Stuckernath  
1977 *Progress Report on the Meadowcroft Rockshelter: a 16,000 year Chronicle. In Amerinds and Their Paleoenvironments in Northeastern North America*, edited by Walter S. Newman and Bert Salwen, pp. 137-159, Annals of the New York Academy of Science 288.
- Ahler, S. A.  
1989 Mass Analysis of Flaking Debris: Studying the Forest Rather than the Trees. In *Alternative Approaches to Lithic Analysis*, edited by D. O. Henry and G. H. Odell, pp. 85-118. Archaeological Papers of the American Anthropological Association Number 1.
- Anderson, D. G.  
1982 The Mattassee Lake Ceramic Artifact Assemblage. In *The Mattassee Lake Sites: Archaeological Investigation Along the Lower Santee River in the Coastal Plain of South Carolina*, D. G. Anderson, C. E. Cantley, and A. L. Novick, pp. 207-321. Special Publication, USDI-National Park Service, Interagency Archeological Services. Atlanta.
- 1990 The Paleoindian Colonization of Eastern North America: A View from the Southeastern United States. In *Early Paleoindian Economies of Eastern North America*, edited by Kenneth B. Tankersley and Barry L. Isaac, pp.163-216. Research in Economic Anthropology, A Research Annual, Supplement 5. JAI Press, Inc. Greenwich, CT.

## References Cites

---

- Anderson, D. G. (cont.)  
1996 Approaches to Modeling Regional Settlement in the Archaic Period Southeast. In *Archaeology of the Mid-Holocene Southeast*, edited by K.E. Sassaman and D.G. Anderson, pp. 157–176. University Press of Florida.
- Anderson, D. G., C. E. Cantley, and A. L. Novick  
1982 *The Mattassee Lake Sites: Archaeological Investigation Along the Lower Santee River in the Coastal Plain of South Carolina*. Special Publication, USDI-National Park Service, Interagency Archaeological Services. Atlanta.
- Anderson, D. G., and G. T. Hanson  
1988 Early Archaic Settlement in the Southeastern United States: A Case Study from the Savannah River Valley. *American Antiquity* 53(2):261-286.
- Anderson, D. G., and J. W. Joseph  
1988 *Prehistory and History Along the Upper Savannah River: Technical Synthesis of Cultural Resource Investigations, Richard B. Russell Multiple Resource Area*. Russell Papers, Interagency Archaeological Services Division, National Park Service, Atlanta.
- Anderson, D. G., R. J. Ledbetter, and L. O'Steen  
1990 *Paleoindian Period Archaeology of Georgia*. University of Georgia, Laboratory of Archaeology Series, Report Number 28. Athens.
- Anderson, D. G., S. T. Lee, and A. R. Parler  
1979 *Cal Smoak: Archaeological Investigations Along the Edisto River in the Coastal Plain of South Carolina*. Archaeological Society of South Carolina, Occasional Papers No. 1.
- Anderson, D. G., and T. Logan  
1981 *Francis Marion National Forest: A Cultural Resources Overview*. U.S.D.A. Forest Service, Columbia, SC.
- Anderson, D. G., L. D. O'Steen, and K. E. Sassaman  
1996 Environmental and Chronological Considerations. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 1-15. University of Alabama Press, Tuscaloosa.
- Anderson, D. G., and K. E. Sassaman  
1996 Modeling Paleoindian and Early Archaic Settlement in the Southeast: An Historical Perspective. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 16-28. The University of Alabama Press, Tuscaloosa.
- Anderson, D. G., and J. Schuldenrein  
1983 Early Archaic Settlement on the Southeastern Atlantic Slope: A View from the Rucker's Bottom Site, Elbert County, Georgia. *North American Archaeologist* 4:177-210.  
  
1985 *Prehistoric Human Ecology Along the Upper Savannah River: Excavations at the Rucker's Bottom, Abbeville, and Bullard Site Groups*. Russell Papers, National Park Service, Interagency Archaeological Services Division, Atlanta.
- Andrews, J. T.  
1973 The Wisconsin Laurentide Ice Sheet; Dispersed Centres, Problems of Rates of Retreat, and Climatic Implications. *Arctic and Alpine Resources* 5:185-199.

- Asch, D., and N. B. Asch  
 1982 A Chronology for the Development of Prehistoric Horticulture in West Central Illinois. Paper presented at the 47th Annual Meeting of the Society for American Archaeology. Minneapolis, Minnesota.
- Balek, C. L.  
 2002 Buried Artifacts in Stable Upland Sites and the Role of Bioturbation: A Review. *Geoarchaeology: An International Journal* 17(1): 41-51.
- Bartko, J. J., S. W. Greenhouse, and C. S. Patlak  
 1968 On Expectations of Some Functions of Poisson Variates. *Biometrics* 24:97-102.
- Bartlett, C. S., Jr.  
 1967 Geology of the Southern Pines Quadrangle North Carolina. Unpublished Master's Thesis, Department of Geology, University of North Carolina, Chapel Hill.
- Bates, J. F.  
 1998 Personal Communication to C. E. Cantley.
- Bender, M. M., D. Baerreis, and R. L. Stevenson  
 1981 Further Light on Carbon Isotopes and Hopewell Agriculture. *American Antiquity* 46(2):346-353.
- Bennett, S. H., and B. Pittman  
 1991 Longleaf Pine: A Brief History of the Species and Associated Communities, with Recommendations for Protection. Ms. on file, South Carolina Heritage Trust.
- Benson, R. W.  
 1995 *Survey of Selected Timber Stands in Tyger Ranger District Sumter National Forest Laurens and Union Counties, South Carolina*. Report prepared for the Sumter National Forest by Southeastern Archaeological Services, Athens, Georgia.
- 1998 *Living on the Edge: Cultural resources Survey of the Overhills Tract, 10,546 Acres in Harnett and Cumberland Counties, North Carolina*. Prepared for the U. S. Army Corp of Engineers, Savannah District. G. E. C., Inc., Baton Rouge and Southeastern Archaeological Services, Inc., Athens.
- 1999 *Cultural Resources Survey of 3800 Acres in the Uwharrie National Forest, Compartments 8, 9, 18, 19, 23, and 24, Montgomery and Randolph Counties, North Carolina*. Prepared for Directorate of Public Works and Environment, Fort Bragg, North Carolina and USFS, Uwharrie National Forest, Asheville. Southeastern Archaeological Services, Inc., Athens.
- 2000 *Archaeological Testing of 50 Sites, Overhills Tract, Fort Bragg, Harnett and Cumberland Counties, North Carolina*. Southeastern Archaeological Services, Inc., Athens.
- 2002 *Cultural Resources Survey of 2,045 Acres in Four Survey Areas, Fort Bragg, Hoke and Cumberland Counties, North Carolina*. Southeastern Archaeological Services, Inc., Athens.
- Binford, L. R.  
 1982 The Archaeology of Place. *Journal of Anthropological Archaeology* 1:5-31.

## References Cites

---

- Blank, S., C. Seiter, and P. Bruce  
2001 *Resampling Stats in Excel*, Version 2. Resampling Stats, Inc., Arlington, Virginia.
- Blanton, D. B.  
1983 Lithic Raw Material Procurement and Use During the Morrow Mountain Phase in South Carolina. Unpublished M. A. Thesis, Department of Anthropology, Brown University.
- Blanton, D. B., and K. E. Sassaman  
1989 Pattern and Process in the Middle Archaic Period of South Carolina. In *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson*, edited by Albert C. Goodyear, III and Glen T. Hanson, pp.53-72. Institute of Archaeology and Anthropology, University of South Carolina, Anthropological Studies No. 9. Columbia.
- Bocek, B.  
1986 Rodent Ecology and Burrowing Behavior: Predicted Effects on Archaeological Site Formation. *American Antiquity* (51): 589-603.
- Boutton, T.W., P.D. Klein, M.J. Lynott, J.E. Price, L.L. Tieszen  
1984 Stable Carbon Isotope Ratios as Indicators of Prehistoric Human Diet. In *Stable Isotopes in Nutrition*, edited by J.R. Turnland and P.E. Johnson, pp. 191-204. American Chemical Society Symposia Series 258.
- Bradley, B. A.  
1973 Lithic Reduction Sequences: A Glossary and Discussion. In *Lithic Technology: Making and Using Stone Tools*, edited by E. Swanson, pp. 5-13. Mouton Publishers, The Hague.
- Braley, C. O.  
1989 *Cultural Resources Survey of the Master Plan Lands, Fort Bragg, North Carolina*. Gulf Engineers & Consultants, Inc., Baton Rouge, and Southeastern Archaeological Services, Inc., Athens. Report submitted to the US Army Corps of Engineers, Savannah District, Contract No. DACA21-87-D-0539. Copies available from Cultural Resources, Environmental and Natural Resources Division, Fort Bragg (Project No. 1988-1[17]).  
  
1990 *Fort Bragg Historic Preservation Plan, Vol 1*. Southeastern Archaeological Services, Inc., Athens, Georgia. Report submitted to U. S. Army Corps of Engineers, Savannah District, XVIII Airborne Corps, and Fort Bragg, North Carolina.
- Braley, C. O., and J. Schuldenrein  
1993 *An Intensive Cultural Resources Survey and Site Testing on Fort Bragg's Sicily Drop Zone, Hoke County, North Carolina*. Gulf Engineers & Consultants, Inc., Baton Rouge, Louisiana, and Southeastern Archaeological Services, Inc., Athens, Georgia. Submitted to U. S. Army Corps of Engineers, Savannah District, Headquarters, XVIII Airborne Corps, and Fort Bragg, North Carolina.
- Braun, L. E.  
1950 *Deciduous Forests of Eastern North America*. Hafner Publishing Company, New York.
- Brooks, M. J., and V. Canouts, editors  
1984 *Modeling Subsistence Change in the Late Prehistoric Period in the Interior Lower Coastal Plain of South Carolina*. Anthropological Studies No 6. South Carolina Institute of Archaeology and Anthropology, University of South Carolina.

- Brooks, M. J., and G. T. Hanson  
 1987 *Late Archaic-Late Woodland Adaptive Stability and Change in the Interior Lower Coastal Plain of South Carolina*. Draft. Savannah River Operations Office, U.S. Department of Energy. Ms. on file, Savannah River Archaeological Research Program, SCIAA, University of South Carolina.
- Brooks, M. J., and K. E. Sassaman  
 1990 Environmental Background and Models. In *Native American Prehistory of the Middle Savannah River Valley: A Synthesis of Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina*, edited by M. J. Brooks, K. E. Sassaman, and G. T. Hanson, pp. 19-66. Occasional Papers of the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, No. 1. Columbia.
- Brooks, M. J., P. A. Stone, D. J. Colquhoun, and J. G. Brown  
 1989 Sea Level Change, Estuarine Development and Temporal Variability in Woodland Period Subsistence-Settlement Patterning on the Lower Coastal Plain of South Carolina. In *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson*, edited by Albert C. Goodyear, III and Glen T. Hanson, pp. 91-110. Occasional Papers of the South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Anthropological Studies No. 9.
- Brooks, M. J., P. A. Stone, D. J. Colquhoun, J. Brown, and K. B. Steele  
 1986 Geoarchaeological Research in the Coastal Plain Portion of the Savannah River Valley. *Geoarchaeology: An International Journal* 1(3):293-307.
- Brooks, M. J., B. E. Taylor, P. Stone, and L. R. Gardner  
 1998 Correlation of Eolian Sand Sheet Deposits and the Archeological Record with the Evolution of Big Bay. In *Archaeological Data Recovery at Sites 38SU45, 38SU133, and 38SU145, with Results of Test Excavations Conducted at Sites 38SU136, 38SU137, and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina*, by J. S. Cable and C. E. Cantley, pp. 55-76. Report prepared for U.S. Army Corps of Engineers, Fort Worth District and Headquarters Air Combat Command. Geo-Marine, Inc., Plano, Texas.
- Brose, D. S., and N. Greber  
 1979 *Hopewell Archaeology*. Kent State University Press, Kent, Ohio.
- Brown, J. A.  
 1985 Long-term Trends to Sedentism and the Emergence of Complexity in the American Midwest. In *Prehistoric Hunter-Gatherers: the Emergence of Cultural Complexity*, edited by T. D. Price and J. A. Brown, pp. 201-231. Academic Press, Orlando.
- Brown, J. G.  
 1981 Palynologic and Petrographic Analyses of Bayhead Hammock and Marsh Peats at Little Salt Spring Archaeological Site (8-So-18), Florida. Unpublished M. S. Thesis, Department of Geology, University of South Carolina. Columbia.
- Broyles, B. J.  
 1966 Preliminary Report: The St. Albans Site (46Ka27), Kanawha County, West Virginia. *West Virginia Archaeologist* 19: 1-43.
- 1969 Distribution of Southeastern Archaic Projectile Points in the Ohio Valley. *Southeastern Archaeological Conference Bulletin* 11:31-36.



## References Cites

---

- Broyles, B. J. (cont.)  
1971 *Second preliminary report: The St. Albans Site, Kanawha County, West Virginia.* West Virginia Geological and Economic Survey, Reports of Archaeological Investigations 3.
- Bulter, J. R.  
1991 Metamorphism. In *The Geology of the Carolinas: Carolina Geological Society Fiftieth Anniversary Volume*, edited by J. W. Horton, Jr., and V. A. Zullo, pp. 127-141. University of Tennessee Press, Knoxville.
- Butzer, K. W.  
1988 A "Marginality: Model to Explain Major Spatial and Temporal Gaps in the Old and New World Pleistocene Settlement Records. *Geoarchaeology* 3:193-203.
- Cable, J. S.  
1982a Organizational Variability in Piedmont Hunter-Gatherer Lithic Assemblages. In *The Haw River Sites: Archaeological Investigation at Two Stratified Sites in the North Carolina Piedmont*, assembled by S. R. Claggett and J. S. Cable, pp. 637-688. Commonwealth Associates, Inc. Report R-2386, Jackson, MI. U.S. Army Corps of Engineers, Wilmington District.
- 1982b Lithic Assemblage Analysis - 31CH29, Block A. In *The Haw River Sites: Archaeological Investigation at Two Stratified Sites in the North Carolina Piedmont*, assembled by Stephen R. Claggett and John S. Cable, pp. 317-538. Commonwealth Associates, Inc. Report R-2386, Jackson, MI. U.S. Army Engineer District, Wilmington. Wilmington, North Carolina.
- 1996 Haw River Revisited: Implications for Modeling Terminal Late Glacial and Early Holocene Hunter-Gatherer Settlement Systems in the Southeast. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 107-148. The University of Alabama Press, Tuscaloosa.
- 1998 Ceramic Analysis: A Study of Taxonomy and Systematics in the North Coastal Zone. In *Data Recovery Excavations at the Maple Swamp (38HR309) and Big Jones (38HR315) Sites on the Conway Bypass, Horry County, South Carolina*, J. S. Cable, K. F. Styer, and C. E. Cantley, pp. 239-324. Report prepared for the South Carolina Department of Transportation, Columbia. New South Associates Technical Report 385.
- 2002 Ceramic Artifact Analysis. In *Archaeological Data Recovery at Sites 38SU136/137 and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina.*, edited by C. E. Cantley and J. S. Cable, pp. 163-234. Report prepared for U. S. Army Corps of Engineers, Savannah District. New South Associates, Inc., Stone Mountain.
- Cable, J. S., and C. E. Cantley  
1998 *Archaeological Data Recovery at Sites 38SU45, 38SU133, and 38SU145, with Results of Test Excavations Conducted at Sites 38SU136, 38SU137, and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina.* Report submitted to U. S. Army Corps of Engineers, Fort Worth District and Headquarters Air Combat Command, Langley A. F. B. Report prepared by Geo-Marine, Inc., Plano, Texas.
- 2002 Prehistoric Site Structure and Settlement. In *Archaeological Data Recovery at Sites 38SU136/137 and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina.*, edited by C. E. Cantley and J. S. Cable, pp. 235-342. Report prepared for U. S. Army Corps of Engineers, Savannah District. New South Associates, Inc., Stone Mountain.

- 
- Cable, J. S., and C. B. Donaldson  
 1988 Estimation and Evaluation of Field House Densities from Dispersed Trench Samples. In *Arizona Department of Transportation Archaeological testing Program: Part 2, East Papago Freeway*, edited by D. G. Landis, pp. 277-292. Soil Systems Publications in Archaeology 13. Phoenix.
- Cable J. S., H. A. Gard, P. Evans-Shumate, and M. B. Reed  
 1994 *Intensive Archaeological Survey of Salt Pond, South Tibwin, Bellview, and Brick Church Tracts, Wambaw Ranger District, Francis Marion National Forest, Charleston, South Carolina*. Report submitted to USDA Forest Service, McClellanville, South Carolina. New South Associates Technical Report 243. Stone Mountain.
- Cable, J. S., D. R. Lawrence, and L. A. Raymer  
 1991 *Archeological Test Excavations On The Northeastern Perimeter Of The Buck Hall Site (38 Ch 644), Buck Hall Recreation Area, Francis Marion National Forest, South Carolina*. USDA Forest Service, Francis Marion and Sumter National Forests. New South Associates Technical Report 44.
- Cable, J. S., L. D. O'Steen, L. E. Raymer, J. H. N. Loubser, D. S. Leigh, J. W. Joseph, M. B. Reed, L. Danielsson-Murphy, U. McEvoy, T. Murphy, M. T. Bonhage-Freund, D. Walsmith  
 1997 *"A Picture Unsurpassed," Prehistoric and Historic Indian Settlement and Landscape, Brasstown Valley, Towns County, Georgia*. New South Associates, Inc. Technical Report No. 457.
- Cable, J. S., K. F. Styer, and C. E. Cantley  
 1998 *Data Recovery Excavations at the Maple Swamp (38HR309) and Big Jones (38HR315) Sites on the Conway Bypass, Horry County, South Carolina*. Report prepared for the South Carolina Department of Transportation, Columbia. New South Associates Technical Report 385. Stone Mountain.
- Cable, J. S., G. I. Williams, C. L. Abrams, M. B. Reed, and T. M. Hamby  
 1993 *Cultural Resources Survey and Archaeological Site Evaluation of the Edisto Beach State Park, Colleton County, South Carolina*. Report prepared for South Carolina Parks, Recreation, and Tourism, Columbia. New South Associates Technical Report 165. Stone Mountain.
- Cambron, J. W., and D. C. Hulse  
 1960 The Transitional Paleo-Indian in Northern Alabama and South Tennessee. *Journal of Alabama Archaeology* 6(1):14-26.  
 1969 *Handbook of Alabama Archaeology: Part I, Point Types*. Archaeological Research Association of Alabama.
- Caldwell, J. R.  
 1958 *Trend and Tradition in the Prehistory of the Eastern United States*. Memoir No. 88. American Anthropological Association, Springfield, Illinois.
- Caldwell, J. R., and C. McCann  
 1941 *Irene Mound Site, Chatham County, Georgia*. University of Georgia Press, Athens.
- Cantley, C. E.  
 1998 *Lithic Analysis*. In *Archaeological Data Recovery at Sites 38SU45, 38SU133, and 38SU145, with Results of Test Excavations Conducted at Sites 38SU136, 38SU137, and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina*, J. S. Cable and C. E. Cantley, pp. 155-188. Report submitted to U. S. Army Corps of Engineers, Fort Worth District and Headquarters Air Combat Command, Langley A. F. B. Report prepared by Geo-Marine, Inc., Plano, Texas.
-

## References Cites

---

Cantley, C. E. (cont.)

- 2000 *Archaeological Data Recovery at Richburg Quarry Site (38CS217) Chester County, South Carolina.* Report Submitted to the South Carolina Department of Transportation, Columbia, South Carolina by New South Associates, Stone Mountain, GA. New South Technical Report 619.
- 2002 *Lithic Artifact Analysis.* In *Archaeological Data Recovery at Sites 38SU136/137 and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina*, C. E. Cantley and J. S. Cable, pp. 111-162. Report prepared for U. S. Army Corps of Engineers, Savannah District. New South Associates, Inc., Stone Mountain.

Cantley, C. E., and J. S. Cable

- 2002 *Archaeological Data Recovery at Sites 38SU136/137 and 38SU141, Poinsett Electronic Combat Range, Sumter County, South Carolina.* Report prepared for U. S. Army Corps of Engineers, Savannah District. New South Associates, Inc., Stone Mountain.

Cantley, C. E., and J. Kern, editors

- 1984 *A Cultural Resource Survey of the Proposed Recreational Development Areas and Wildlife Subimpoundments at the B. Everett Jordan Dam and Lake.* U.S. Army Engineer District, Wilimington, Wilmington, North Carolina. Commonwealth Associates Report of Investigations No. R-2573, Jackson, Michigan.

Cantley, C. E., A. L. Novick, and J. Kern

- 1984 *Research Design.* In *A Cultural Resource Survey of the Proposed Recreational Development Areas and Wildlife Subimpoundments at the B. Everett Jordan Dam and Lake*, edited by C. E. Cantley, and J. Kern, pp. 57-86. U.S. Army Engineer District, Wilimington, Wilmington, North Carolina. Commonwealth Associates Report of Investigations No. R-2573, Jackson, Michigan.

Cantley, C. E., and L. Raymer

- 1990 *Data Recovery at Site 31Am278: A Late Woodland Field Campsite Located in Alamance County, North Carolina. City of Graham, North Carolina.* New South Associates Technical Report No. 21, New South Associates, Stone Mountain, Georgia.

Carlson, D. L.

- 1979 *Hunter-Gatherer Mobility Strategies: An Example from the Koster Site in the Lower Illinois Valley.* Ph. D. Dissertation, Department of Anthropology, Northwestern University.

Chapman, J.

- 1975 *The Rose Island Site and the Bifurcate Point Tradition.* Report of Investigations No. 14, Department of Anthropology, University of Tennessee.
- 1976 *The Archaic Period in the Lower Little Tennessee River Valley: The Radiocarbon Dates.* *Tennessee Anthropologist* 1(1): 1-12.
- 1977 *Archaic Period Research in the Lower Little Tennessee River Valley-1975: Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island.* Department of Anthropology, University of Tennessee, Report of Investigations No. 18. Knoxville.
- 1985 *Tellico Archaeology:12,000 Years of Native American History.* University of Tennessee Press, Knoxville.

- 
- Chapman, J., and A. B. Shea  
1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. *Tennessee Anthropologist* 6(1).
- Charles, T.  
1981 Dwindling Resources: An Overture to the Future Of South Carolina's Archaeological Resources. *Notebook* 13: January-December 1981.
- Clafin, W. H., Jr.  
1931 *The Stallings Island Mound, Columbia County, Georgia*. Harvard University, Papers of the Peabody Museum of American Archaeology and Ethnology No. 14(1). Cambridge.
- Claggett, S. R., and J. S. Cable, assemblers  
1982 *The Haw River Sites: Archeological Investigations at Two Stratified Sites in the North Carolina Piedmont*. Report prepared for U. S. Army Corps of Engineers, Wilmington District. Commonwealth and Associates, Incorporated.
- Clausen, C. J., A. D. Cohen, C. Emeliani, J. A. Holman and J. J. Stipp  
1979 Little Salt Spring, Florida: A Unique Underwater Site. *Science* 203(4381):609-614.
- Clay, R. B.  
1998 The Essential Features of Adena Ritual and Their Implications. *Southeastern Archaeology* 17: 1-21.
- Cleland, C.E.  
1965 Barren Ground Caribou (*Rangifer arcticus*) From an Early Man Site in Southeastern Michigan. *American Antiquity* 30:350-51.  
  
1976 The Focal-Diffuse Model: An Evolutionary Perspective on the Prehistoric Cultural Adaptations of the Eastern United States. *Mid-Continental Journal of Archaeology* 1:59-76.
- Clement, C. O., S. D. Smith, R. M. Grunden, and J. S. Quattlebaum  
1997 *Archaeological Survey of 4,000 Acres on the Lower Little River, Cumberland, Hoke, and Moore Counties, Fort Bragg, North Carolina*. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Cliff, M. B., and J. S. Cable  
1999 Conclusions and Recommendations. In *Test Excavations at 20 Archaeological Sites on the Poinsett Electronic Combat Range, Sumter County, South Carolina*, By M. B. Cliff, J. S. Cable, and G. A. Hebler, pp. 411-436. Report submitted to U. S. Army Corps of Engineers, Fort Worth District and Headquarters Air Combat Command, Langley A. F. B. Report prepared by Geo-Marine, Inc., Plano, Texas.
- Coe, J. L.  
1952 The Cultural Sequence of the Carolina Piedmont. In *Archaeology of the Eastern United States*, edited by James B. Griffin, pp. 301-311. University of Chicago Press, Chicago.  
  
1964 *The Formative Cultures of the Carolina Piedmont*. Transactions of the American Philosophical Society 54(5). Philadelphia.  
  
1995 *Town Creek Indian Mound, A Native American Legacy*. The University of North Carolina Press, Chapel Hill.
-

## References Cites

---

- Colby, M. M.  
1958 *The Geographic Structure of Southeastern North Carolina*. University of Chicago, Department of Geography Research Paper No. 58. University of Chicago Press, Illinois.
- Collard, E,  
1967 *Nineteenth Century Pottery and Porcelain in Canada*. McGill University Press, Montreal.
- Colquhoun, D. J., and M. J. Brooks  
1986 New Evidence from the Southeastern U. S. for Eustatic Components in the Late Holocene Sea Levels. *Geoarchaeology* 1:275-291.
- Colquhoun, D. J., M. J. Brooks, W. H. Abbott, F. W. Stapor, W. S. Newman, and R. R. Pardi  
1980 Principles and Problems in Establishing a Holocene Sea Level Curve for South Carolina. In *Excursions in Southeastern Geology, the Archaeology-Geology of the Georgia Coast*, edited by James D. Howard, Chester B. DePratter, and Robert W. Fray, pp.143-159. Geological Society of America Guidebook No. 20.
- Conrad, N., D.L. Asch, N.B. Asch, D. Elmore, H.E. Grove, M. Rubin, J.A. Brown, M.D. Wiant, K.B. Farnsworth, and T.G. Cook  
1984 Prehistoric Horticulture in Illinois: Accelerator Radiocarbon Dating of the Evidence. *Nature* 308:443-446.
- Cowan, C. W.  
1984 From Foraging to Incipient Food Production: Subsistence Change and Continuity on the Cumberland Plateau of Eastern Kentucky. Ph. D. dissertation, University of Michigan, Ann Arbor. University Microfilm, Ann Arbor.
- Cowan, C.W., E. Jackson, K. Moore, A. Nickelhoff, and T. Smart  
1981 The Cloudsplitter Rock Shelter, Menifee County, Kentucky: A Preliminary Report. *Southeastern Archaeological Conference Bulletin* 24:60-75.
- Crawford, R. G. H.  
1966 An Archaeological Survey of Lenoir County, North Carolina. MA Thesis, Department of Anthropology, University of Florida, Gainesville.
- Croker, T.C., Jr.  
1987 *Longleaf Pine: A History of Man and a Forest*. U.S.D.A. Forest Service R8-FR 7. Forest Service Southern Region, Atlanta.
- Cunningham, J.  
1982 *The Collector's Encyclopedia of American Dinnerware*. Collector Books, Paducah, Kentucky.
- Daniel, R. I.  
1992 Early Archaic Settlement in the Southeast: A North Carolina Perspective. In *Paleoindian and Early Archaic Period Research in the Lower Southeast: A South Carolina Perspective*, edited by D. G. Anderson, K.E. Sassaman, and C. Judge. Council of South Carolina Professional Archaeologist in conjunction with Savannah River Archaeological Research Program South Carolina Institute of Archaeology and Anthropology University of South Carolina, Columbia.



---

Daniel, R. I. (cont.)

- 1994    Hardaway Revisited: Early Archaic Settlement in the Southeast. Unpublished Ph.D. dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.
- 1996    Raw Material Availability and Early Archaic Settlement in the Southeast. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 84-91. The University of Alabama Press, Tuscaloosa.
- 1998    *Hardaway Revisited: Early Archaic Settlement in the Southeast*. University of Alabama Press, Tuscaloosa.
- 2002    Early Archaic Tool Assemblage. In *G. S. Lewis-East: Early and Late Archaic Occupations Along the Savannah River, Aiken County, South Carolina*, edited by K. E. Sassaman, I. R. Daniel, Jr., and C. R. Moore, pp. 45-72. Savannah River Archaeological Research papers 12. SCIAA, University of South Carolina, Columbia.

Daniel, R. I., and J. R. Butler

- 1996    An Archaeological Survey and Petrographic Description of Rhyolite Sources in the Uwharrie Mountains, North Carolina. *Southern Indian Studies* 45:1-37.

Darwin, C.

- 1896    *The Formation of Vegetable Mold through the Action of Worms*. D. Appleton, New York.

Davis, M. B.

- 1976    Pleistocene Biogeography of Temperate Deciduous Forests. In *Geoscience and Man, Volume XIII, Ecology of the Pleistocene*, R. C. West and W. A. Haag editors, pp. 13-26. Louisiana State University Press, Baton Rouge.
- 1983    Holocene Vegetational History of the Eastern United States. In *Late Quaternary Environments of the United States, Part 2*, edited by H. E. Wright, Jr., pp. 166-181. University of Minnesota Press, Minneapolis.

Davis, M. B., and D. B. Botkin

- 1985    Sensitivity of the Fossil Pollen Record to Sudden Climatic Change. *Quaternary Research* 23: 327-340.

Davis, R. P. S., Jr.

- 1987    Pottery from the Fredericks, Wall, and Mitchum Sites. In *The Siouan Project: Seasons I and II*, edited by R. S. Dickens, H. T. Ward, and R. P. S. Davis, Jr, pp. 185-216. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.

DeJarnette, D. L., E. B. Kurjack, and J. W. Cambron

- 1962    Excavations at the Stanfield-Worley Bluff Shelter. *Journal of Alabama Archaeology* 21(2):99-119.

DeJarnette, D. L., J. A. Walthall, and S. B. Wimberly

- 1975    Archaeological Investigations in the Butahatchee River Valley II: Excavations at Stucks Bluff Rock Shelter. *Journal of Alabama Archaeology* 21(2):99-119.

Delcourt, H. R.

- 1979    Late Quaternary Vegetation History of the Eastern Highland Rim and Adjacent Cumberland Plateau of Tennessee. *Ecological Monographs* 49(3):255-280.

## References Cites

---

- Delcourt, H. R., and P. A. Delcourt  
1977 Presettlement Magnolia-Beech Climax of the Gulf Coastal Plain: Quantitative Evidence from the Apalachicola River Bluffs, North-Central Florida. *Ecology* 58:1085-1093.  
1987 *Long-term Forest Dynamics of the Temperate Zone: a Case Study of Late-Quaternary Forests in Eastern North America*. Springer-Verlag, New York.
- Delcourt, P. A., and H. R. Delcourt  
1981 Vegetation Maps for Eastern North America: 40,000 years B.P. to Present. In *Geobotany*, edited by R. Romans, pp. 123-166. Plenum Publishing, New York.
- DePratter, C. B.  
1977 Environmental Changes on the Georgia Coast During the Prehistoric Period. *Early Georgia* 5(1,2).  
1979 Ceramics. In *The Anthropology of St. Catherines Island, 2. The Refuge-Deptford Mortuary Complex*, edited by David Hurst Thomas and Clark Spencer Larsen, pp. 109-132. Anthropological Papers of the American Museum of Natural History No. 56 (1). New York.
- DePratter, C. B., and C. Judge  
1986 A Provisional Late Prehistoric and Early Historic Ceramic Sequence for the Wateree River Valley, South Carolina. Paper presented at the Lamar Institute Conference on South Appalachian Mississippian, May 9-10, 1986. Macon, Georgia.
- Dickens, R. S., Jr.  
1970 *The Pisgah Culture and Its Place in the Prehistory of the Southern Appalachians*. Ph.D. Dissertation, Department of Anthropology, University of North Carolina, Chapel Hill. University Microfilms, Ann Arbor.
- Dickens, R. S., H. T. Ward, and R. P. S. Davis, Jr., editors  
1987 *The Siouan Project: Seasons I and II*. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Dincauze, D. F.  
1984 An Archaeo-Logical Evaluation of the Case for Pre-Clovis Occupations. *Advances in World Archaeology* 3:275-323. Academic Press, New York.
- Dobson, E.  
1850 *A Rudimentary Treatise on the Manufacture of Bricks and Tiles; Containing an Outline of the Principles of Brickmaking, and Detailed Accounts of the Various Processes Employed in the Making of Bricks and Tiles in Different parts of England*. Reprint 1971. *Journal of Ceramic History* 5. Stafford, England.
- Doran, G. H., D. N. Dickel, and L. A. Newsom  
1990 A 7,290 Year-Old Bottle Gourd from the Windover Site, Florida. *American Antiquity* 55(2):354-59.
- Dubar, J. R., H. S. Johnson, Jr., B. Thom, and W. O. Hatchell  
1974 Neogene Stratigraphy and Morphology, South Flank of the Cape Fear Arch, North and South Carolina. In *Post-Miocene Stratigraphy, Central and Southern Atlantic Coastal Plain*, edited by R.Q. Oaks and J.R. Dubar, pp. 139-173. Utah State University Press, Logan.

- Dunbar, J. S., S. D. Webb, and D. Cring  
1990 Culturally and Naturally Modified Bones from a Paleoindian Site in the Aucilla River, North Florida. In *Bone Modification*, Center for the Study of Early Man, Orono, Maine.
- Dunnell, R.  
1971 *Systematics in Prehistory*. The Free Press, New York.
- Eastman, J. M.  
1994 The North Carolina Radiocarbon Date Study (Parts I and II), *Southern Indian Studies* (42-43).
- Ensor, H. B., and J. M. Studer  
1983 Excavations at the Walnut Site: 22IT539. In *Archaeological Investigations in the Upper Tombigbee Valley, Mississippi: Phase I*, edited by Judith Bense, The University of West Florida Office of Cultural and Archaeological Research Report of Investigations 3. U.S. Army Engineer District, Mobile, Mobile, Alabama.
- Faulkner, C. H., and M. C. R. McCollough  
1978 *Sixth Report of the Normandy Archaeological Project*. Department of Anthropology, University of Tennessee, Report of Investigations 21. Knoxville.
- Ferguson, L. G.  
1971 *South Appalachian Mississippian*. Ph. D. Dissertation, Department of Anthropology, University of North Carolina, Chapel Hill. University Microfilms, Ann Arbor.
- Fischer, J. W., Jr., and H. C. Strickland  
1991 Dwellings and Fireplaces: Keys to Efe Pygmy Campsite Structure. In *The Interpretation of Archaeological Spatial Patterning*, edited by E. M. Kroll and T. Douglas Price, pp. 215-236. Plenum Press, New York.
- Fisher, C.  
1987 The Ceramic Collection from the Continental Army Cantonment at New Windsor, New York. *Historical Archaeology* 21:48-57.
- Ford, R. I.  
1985 Patterns of Prehistoric Food Production in North America. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp 341-364. Museum of Anthropology, University of Michigan, Anthropological Papers No. 75. Ann Arbor.
- Forman, S. L., and J. Pierson  
2002 Late Pleistocene Luminescence Chronology of Loess Deposition in the Missouri and Mississippi River Valleys, United States. *Palaeogeography Palaeoclimatology Palaeoecology* 186(1-2): 25-46.
- Frink, D.  
1994 The Oxidizable Carbon Ratio (OCR). A Proposed Solution to Some of the Problems Encountered with Radiocarbon Data. *North American Archaeologist* 15(1).
- Frison, G. C., and B. A. Bradley  
1980 *Folsom Tools and Technology at the Hanson Site, Wyoming*. University of New Mexico Press, Albuquerque.

## References Cites

---

- Frost, C.C., Jr., J. Walker, and R.K. Peet  
1986 Fire-dependent Savannas and Prairies of the Southeast: Original Extent, Preservation Status and Management Problems. In *Wilderness and Natural Areas in the Eastern United States: A Management Challenge*, edited by D.L. Kulhavy and R.N. Connor. Center for Applied Studies, School of Forestry, Stephen F. Austin State University. Nacogdoches, TX.
- Funk, R. E.  
1977 Early Cultures in the Hudson Drainage Basin. In *Amerinds and Their Paleoenvironments in Northeastern North America*, edited by Walter S. Newman and Bert Salwen, pp. 137-159. Annals of the New York Academy of Sciences 288.
- Gaiser, E. E., B. E. Taylor, and M. J. Brooks  
2001 Establishment of Wetlands on the Southeastern Atlantic Coastal Plain: Paleolimnological Evidence of a Mid-Holocene Hydrologic Threshold from a South Carolina Pond. *Journal of Paleolimnology* 26: 373-391.
- Gardner, W. M.  
1974 *The Flint Run Complex: Pattern and Process During the Paleo-Indian to Early Archaic. In The Flint Run Paleo-Indian Complex: A Preliminary Report 1971-73*, William M. Gardner (ed.). Occasional Publications No. 11, Archaeology Laboratory, Department of Anthropology, Catholic University, Washington, D.C.  
1979 Paleo-Indian Settlement Patterns and Site Distribution in the Middle Atlantic. Ms. on File, Department of Anthropology, Catholic University, Washington, D.C.
- Gardner, W. M., and R.A. Verrey  
1979 Typology and Chronology of Fluted Points From the Flint Run Area. *Pennsylvania Archaeologist* 19(1):13-46.
- Gates, W. L.  
1976 Modeling the Ice-Age Climate. *Science* 191:1138-1144.
- Goman, M., and D. S. Leigh  
2003 *Palynological and Paleoenvironmental Studies of Three Sites at Fort Bragg and Camp Mackall, Cumberland, Hoke, and Scotland Counties, North Carolina*. Report prepared for U. S. Army Construction Engineering Research Laboratory. TRC Garrow Associates, Inc., Durham, North Carolina.
- Goodyear, A. C., III  
1974 *The Brand Site: A Techno-functional Study of a Dalton Site in Northeast Arkansas*. Research Series 7, Arkansas Archaeological Survey, Fayetteville.  
1979 A Hypothesis for the Use of Cryptocrystalline Raw Materials Among Paleoindian Groups of North America. *Institute of Archaeology and Anthropology, University of South Carolina, Research Manuscript Series* 156. Columbia.  
1983 A Review and Synthesis of Early Archaic Research in South Carolina. Paper Presented at the 40th Annual Meeting of the Southeastern Archaeological Conference, Columbia, S.C.  
2002 Personal Communication. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

- Goodyear, A. C., J. H. House, and N. W. Ackerly  
 1979 *Laurens-Anderson: An Archaeological Study of the Inter-riverine Piedmont*. South Carolina Institute of Archaeology and Anthropology, Anthropological Series 4. University of South Carolina, Columbia.
- Goodyear, A. C., III, J. L. Michie, and T. Charles  
 1989 The Earliest South Carolinians. In *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson*, edited by Albert C. Goodyear, III and Glen T. Hanson, pp.19-52. Institute of Archaeology and Anthropology, University of South Carolina, Anthropological Studies No. 9. Columbia.
- Gremillion, K. J.  
 1987 Plant Remains from the Fredricks, Wall, and Mitchum Sites. In *The Siouan Project: Seasons I and II*, edited by Roy S. Dickens, H. Trawick Ward, and R. P. Stephen Davis, Jr., pp. 259-278. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Graham, R. W., C. V. Haynes, D. Johnson, and M. Kay  
 1981 Kimmswick: A Clovis-Mastodon Association in Eastern Missouri. *Science* 213:1115-1117.
- Grayson, Donald K.  
 1987 An Analysis of the Chronology of Late Pleistocene Mammalian Extinctions in North America. *Quaternary Research* 28:281-289.
- Griffin, J. B.  
 1945 Ceramic Collections from Two South Carolina Sites. *Papers of the Michigan Academy of Science, Arts, and Letters* 30: 465-478.  
 1952 *Archaeology of Eastern United States*. James B. Griffin (ed.). University of Chicago Press, Chicago.
- Griffin, J. W.  
 1974 *Investigations in Russell Cave*. Publications in Archeology 13, National Park Service, Department of the Interior, Washington.
- Griffin, M., W. Boyko, B. Boyko, S. Culpepper, C. Heath, Jr., J. Hebert, J. Irwin, and B. Lione  
 2001 Appendix XI: Fort Bragg Physical and Cultural Environment. In Integrated Cultural Resources Management Plan (ICRMP) for Fort Bragg, Camp Mackall, and Simmons Airfield. Report submitted to XVIII Airborne Corps and Fort Bragg by Griffin Social Technologies, Inc, Chesapeake, VA.
- Gunn, J. D., and K. J. Wilson  
 1993 *Archaeological Data Recovery Investigations at Sites 38CT54 and 38CT58 along the SC 151 Jefferson Bypass, Chesterfield County, South Carolina*. Garrow and Associates, Inc., Raleigh. Submitted to the South Carolina Department of Highways and Public Transportation, Columbia.
- Hackbarth, M. R., and D. M. Fornier-Hackbarth  
 1981 Prehistoric Settlement in Sampson County, North Carolina. Ms. on file, North Carolina Division of Archives and History, Raleigh.



## References Cites

---

- Haggett, P., Cliff, A. D., and A. Frey  
1977 *Locational Models*, Second Edition. John Wiley and Sons, New York.
- Hally, D. J., and J. L. Rudolph  
1986 *Mississippi Period Archaeology of the Georgia Piedmont*. University of Georgia, Laboratory of Archaeology Series No. 24.
- Hanson, G. T., Jr.  
1982 The Analysis of Late Archaic-Early Woodland Adaptive Change Along the Middle Savannah River: A Proposed Study. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* 14:1-38.
- Hare, F. K.  
1976 Late Pleistocene and Holocene Climates: Some Persistent Problems. *Quaternary Research* 6: 507-517.
- Hargrove, T.  
1993 *Archaeological Excavations at 31NH142, Hanip's Landing, River Road Park, New Hanover County North Carolina*. Report submitted by Archaeological Research Consultants, Inc. to New Hanover County Department of Parks and Recreation. Wilmington, North Carolina.
- Hargrove, T., and J. M. Eastman  
1997 Limestone-tempered Ceramics from the Lower Cape Fear River Region, New Hanover County, North Carolina. *North Carolina Archaeology*. In Press, Ms. 1997.
- Harper, F., editor  
1958 *The Travels of William Bartram: Naturalist's Edition*. Yale University Press, New Haven.
- Hartshorn, G. S.  
1972 *Vegetation and Soil Relationships in Southern Beaufort County, North Carolina*. J. Elisha Mitchell Scientific Society 88:226-240.
- Hayden, B.  
1979a Snap, Shatter, and Superfractures: Use-Wear of Stone Skin Scrapers. In *Lithic Use-Wear Analysis*, edited by B. Hayden, pp. 207-230. Academic Press, New York.  
1979b *Paleolithic Reflections: Lithic Technology and Ethnographic Excavations Among Australian Aborigines*. Australian Institute of Aboriginal Studies, Canberra.
- Haynes, C. V., Jr., D. J. Donahue, A. J. T. Jull, and T. H. Zabel  
1984 Application of Accelerator Dating to Fluted Point Paleoindian sites. *Archaeology of Eastern North America* 12:184-191.
- Hays, J. D., J. Imbrie, and N. J. Shackleton  
1976 Variations in the Earth's Orbit: Pacemaker of the Ice Ages. *Science* 194:1121-32.
- Herbert, J. M.  
1999 Prehistoric Pottery Taxonomy and Sequence on the Southern Coast of North Carolina. *North Carolina Archaeology* 48:37-58.  
2002 Personal Communication to J. S. Cable

- 
- Herbert, J. M. (cont.)  
 2003 *Woodland Ceramics and Social Boundaries of Coastal North Carolina*. PhD dissertation, University of North Carolina, Chapel Hill.  
 2005 Personal Communication to J. S. Cable
- Herbert, J. M., and M. A. Mathis  
 1996 An Appraisal and Re-evaluation of the Prehistoric Pottery Sequence of Southern Coastal North Carolina. In *Indian Pottery of the Carolinas: Observations from the March 1995 Ceramic Workshop at Hobcaw Barony*, assembled and edited by David G. Anderson, pp. 136-189. Council of South Carolina Professional Archaeologists, Columbia.
- Hilton, W.  
 1967 A Relation of a Discovery by William Hilton, 1664. In *Narratives of Early Carolina, 1650-1708*. Edited by A.S. Salley, pp. 31-62. Reprint of 1911 edition. Barnes and Noble, New York.
- Hitchcock, R. K.  
 1987 Sedentism and Site Structure: Organizational Changes in Kalahari Basarwa Residential Locations. In *Method and Theory for Activity Area Research: An Ethnoarchaeological Approach*, edited by Susan Kent, pp. 374-423. Columbia University Press, New York.
- Holmes, J. A.  
 1883 Indian Mounds of the Cape Fear. In *Weekly Star*, October 26, 1883. Wilmington, NC.
- Holms, M. A.  
 1987 Faunal Remains from the Wall and Fredricks Sites. In *The Siouan Project: Seasons I and II*, edited by Roy S. Dickens, H. Trawick Ward, and R. P. Stephen Davis, Jr., pp. 237-258. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- House, J. H., and D. L. Ballenger  
 1976 *An Archaeological Survey of the Interstate 77 Route in the South Carolina Piedmont*. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Research Manuscript Series 104.
- House, J. H., and R. W. Wogaman  
 1978 *Windy Ridge: A Prehistoric Site in the Inter-Riverine Piedmont in South Carolina*. Occasional Papers of the South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Anthropological Studies No. 3.
- Hudson, B. D.  
 1984 *Soil Survey of Cumberland and Hoke Counties, North Carolina*. U. S. Department of Agriculture.
- Hume, I. N.  
 1980 *A Guide to Artifacts of Colonial America*. Alfred A. Knopf, New York.
- Humphreys, G. S., and P. B. Mitchell  
 1988 Bioturbation: An Important Pedological and Geomorphological Process. *Volume 1. 26th Congress of the International Geographical Union*, Sydney, Australia.
-

## References Cites

---

- Idol, B. S., and S. C. Pullins  
2001 *Phase II Archaeological Evaluation of 25 Sites, Fort Bragg, Camp Mackall, Cumberland, Harnett, and Hoke Counties, North Carolina*. TRC Garrow Associates, Inc. and the William & Mary Center for Archaeological Research.
- ICRMP  
2001 Integrated Cultural Resource Management Plan, XVIII Airborne Corps and Fort Bragg. Directorate of Public Works and Environment, Fort Bragg, North Carolina.
- Irwin, J. D., W. C. J. Boyko, J. M. Herbert, and C. Braley  
1999 Woodland Burial Mounds in the North Carolina Sandhills and Southern Coastal Plain. *North Carolina Archaeology* 48:59-86.
- Jefferies, R. W.  
1982 The Black Earth Site. In *The Carrier Mills Archaeological Project*, edited by R.W. Jefferies and B. Butler, pp. 75-432. Southern Illinois University at Carbondale, Center for Archaeological Investigations, Research Paper No. 33. Carbondale.
- Johnson, D. L.  
1990 Biomantle Evolution and the Redistribution of Earth Materials and Artifacts. *Soil Science* 149: 84-102.
- Johnson, D. L., and D. Watson-Stegner  
1990 The Soil-evolution Model as a Framework for Evaluating Pedoturbation in Archaeological Site Formation. In *Archaeological Geology of North America*, edited by N. P. Lasca and J. Donahue, pp. 541-560. Geological Society of America, Boulder.
- Johnston, David W. and Eugene P. Odum  
1956 Breeding Bird Populations in Relation to Plant Succession on the Piedmont of Georgia. *Ecology* 37:50-62.
- Jones, Grant D.  
1978 The Ethnohistory of the Guale Coast Through 1684. In *The Anthropology of St. Catherines Island: 1. Natural and Cultural History*, by D.H. Thomas, G.D. Jones, R.S. Durham, and C.S. Larsen, pp. 178-209. Anthropological Papers of the American Museum of Natural History No. 55(2). New York.
- Jones, O., and C. Sullivan  
1985 *The Parks Canada Glass Glossary for the Description of Containers, Tablewares, Flat Glass, and Closures*. Parks Canada, Ottawa.
- Justice, N. D.  
1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States, a Modern Survey and Reference*. Indiana University Press, Bloomington.
- Kay, M., F. B. King, and C. K. Robinson  
1980 Cucurbits and Phillips Spring: New Evidence and Interpretations. *American Antiquity* 45:806-822.
- Keel, B. C.  
1970 Excavation at the Red Springs Mound RB4, Robeson County. *Southern Indian Studies* 22:17-22.

- Keel, B. C. (cont.)  
 1976 *Cherokee Archaeology: A Study of the Appalachian Summit*. Univ. of Tennessee Press, Knoxville.
- Keeley, L. H.  
 1980 *Experimental Determination of Stone Tool Uses: A Microwear Analysis*. University of Chicago Press, Chicago.
- Kelly, R. L., and L. C. Todd  
 1988 Coming into the Country: Early Paleoindian Hunting and Mobility. *American Antiquity* 53:231-244.
- Kent, S., and H. Vierich  
 1989 The Myth of Ecological Determinism: Anticipated Mobility and Site Organization of Space. In *Farmers as Hunters: The Implications of Sedentism*, edited by S. Kent, pp. 97-130. Cambridge University Press, Cambridge.
- Kevan, D. K. M.  
 1968 *Soil Animals*. H.F. & G. Witherby, Ltd., London.
- Kimball, L. R.  
 1981 An Analysis of Residential Camp Site Structure for Two Early Archaic Assemblages from Rose Island (40MR44), Tennessee. Unpublished MA Thesis, Department of Anthropology, University of Tennessee, Knoxville.
- 1985 *The 1977 Archaeological Survey: An Overall Assessment of the Archaeological Resources of Tellico Reservoir*. Report of Investigations No. 40, Department of Anthropology, University of Tennessee, Knoxville.
- 1996 Early Archaic Settlement and Technology: Lessons from Tellico. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 149-186. The University of Alabama Press, Tuscaloosa.
- Kimball, L.R., and J. Chapman  
 1977 Other Chipped Stone Artifacts. In *Archaic Period Research in the Lower Little Tennessee River Valley 1975: Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island*, edited by J. Chapman, pp. 54-90. Department of Anthropology, University of Tennessee, Report of Investigations 18.
- Kline, G.W., G.D. Crites, and C.H. Faulkner  
 1982 *The McFarland Project: Early Middle Woodland Settlement and Subsistence in the Upper Duck River Valley in Tennessee*. Tennessee Anthropological Association, Miscellaneous Paper No. 8.
- Klipple, W.E., and W.B. Turner  
 1983 Prehistory and Holocene Land Surface Changes in the Nashville Basin. Paper Presented at the 48th Annual Meeting of the Society for American Archaeology, Pittsburgh.
- Kneberg, M.  
 1956 Some Important Projectile Point Types Found in the Tennessee Area. *Tennessee Archaeologist* 12(1):17-28.
- 1957 Chipped Stone Artifacts of the Tennessee Valley Area. *Tennessee Archaeologist* 13(1):55-66.

## References Cites

---

- Kohlsaatt, T.  
1974 *Elements of Diversity: the Natural Communities of South Carolina*. Nature Conservancy, Washington, D.C.
- Kovel, R., and T. Kovel  
1986 *Kovel's New Dictionary of Marks*. Crown Publisher's, Inc., New York.
- Kowalewski, S. A.  
1995 Large-Scale Ecology in Aboriginal Eastern North America. In *Native American Interactions: Multiscalar Analyses and Interpretations in the Eastern Woodlands*, edited by M.S. Nassaney and K.E. Sassaman, pp. 147–173. University of Tennessee Press.
- Kutzbach, J. E.  
1983 Modeling of Holocene Climates. In *Late Quarternary Environments of the United States. Volume 2. The Holocene*, edited by H. E. Wright, Jr., pp. 271-277. University of Minnesota Press, Minneapolis.
- Kutzbach, J. E., R. Gallimore, S. Harrison, P. Behlig, R. Selin, and F. Laarif  
1998 Climate and Biome Simulations for the Past 21,000 Years. *Quaternary Science Reviews* 17: 473-506.
- Larsen, Clark Spencer, and David Hurst Thomas  
1982 *The Anthropology of St. Catherines Island, 4. The St. Catherines Period Mortuary Complex*. Anthropological Papers of the American Museum of Natural History No. 57 (4). New York.
- Larson, L. H.  
1970 *Aboriginal Subsistence Technology on the Southeastern Coastal Plain During the Late Prehistoric Period*. Ph. D. Dissertation, Department of Anthropology, University of Michigan. University Microfilms, Ann Arbor.
- 1980 *Aboriginal Subsistence Technology on the Southeastern Coastal Plain During the Late Prehistoric Period*. Ripley P. Bullen Monographs in Anthropology and History No. 2. University Presses of Florida, Gainesville.
- Lautzenheiser, L., M. A. Holm, and J. Eastman  
1994 Limited Data Recovery, Site 31CR267, Mogens Bay Subdivision, Carteret County, North Carolina. Ms. on file, Coastal Carolina Research, Inc., Tarboro. North Carolina.
- Ledbetter, R. J.  
1991 *Archaeological Investigations at Mill Branch Sites 9WR4 and 9WR11*. Warren County, Georgia. Report submitted to the Soil Conservation Service, Atlanta. Southeastern Archaeological Services, Atlanta.
- Lefler, H. T., editor  
1967 *A New Voyage to Carolina by John Lawson*. Second Printing, August 1984, University of North Carolina Press, Chapel Hill.
- Leigh, D. S.  
1998 Evaluating Artifact Burial by Eolian versus Bioturbation Processes, South Carolina Sandhills, USA. *Geoarchaeology: An International Journal* 13(3):309–330.



- Lewis, M. N. T., and M. Kneberg  
1946 *Hiwassee Island*. University of Tennessee Press, Knoxville.
- 1955 The A. L. LeCroy Collection. *Tennessee Archaeologist* 11(2): 75-82.
- Lewis, T. M. N., and M. K. Lewis  
1961 *Eva: An Archaic Site*. University of Tennessee Press, Knoxville.
- Loftfield, T. C.  
1976 "A Brief and True Report.... " An Archaeological Interpretation of the Southern North Carolina Coast. Unpublished Ph.D. dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.
- 1979 *Cultural Resource Reconnaissance of Fort Bragg, Camp Mackall, and Simmons Army Airfield, North Carolina*. Coastal Zone Resources Division, Wilmington. Submitted to the U. S. Army corps of Engineers, Savannah District, Savannah, Georgia.
- Long, Austin, and Bruce Rippeteau  
1974 Testing Contemporaneity and Averaging Radiocarbon Dates. *American Antiquity* 39(2):205-215).
- Longacre, W. A., editor  
1991 *Ceramic Ethnoarchaeology*. University of Arizona, Tucson.
- Luce, R. W., and H. Bell, III  
1981 Altered Rocks In A Fault Zone Near Pageland, South Carolina. *Southeastern Geology* Vol 22 (1) pp. 7-114.
- Lynch, Thomas F.  
1990 Glacial-Age Man in South America?: A Critical Review. *American Antiquity* 55(1):12-36.
- MacCord, H. A., Jr.  
1966 The McLean Mound, Cumberland County, North Carolina. *Southern Indians Studies* 18:3-45.
- Martin, P. S.  
1967 Prehistoric Overkill. In *Pleistocene Extinctions: The Search for a Cause*, P. Martin and H. E. Wright, editors, pp. 75-120. Yale University Press. New Haven.
- 1984 Prehistoric Over-kill: The Global Model. In *Quaternary Extinctions: A Prehistoric Revolution*, edited by P. S. Martin and R. G. Klein, pp. 354-403. The University of Arizona Press. Tucson.
- Martin, R. A., and S. D. Webb  
1974 Late Pleistocene Mammals from the Devil's Den Fauna, Levy County. In *Pleistocene Mammals of Florida*, edited by S. D. Webb, pp. 114-145. University Presses of Florida, Gainesville.
- McNett, C. W., B. A. McMillian and S. B. Marshall  
1977 *The Shawnee-Minisink Site*. In *Amerinds and Their Paleoenvironments in Northeastern North America*, edited by Walter S. Newman and Bert Salwen, pp. 282-296. Annals of the New York Academy of Sciences.

## References Cites

---

- McNutt, C.H., and G.G. Weaver  
1983 *The Duncan Tract Site (40Tr27), Trousdale County, Tennessee*. Tennessee Valley Authority, Publications in Anthropology No. 33.
- Meltzer, D. J.  
1988 Late Pleistocene Human Adaptations in Eastern North America. *Journal of World Prehistory* 2: 1-52.  
1989 Why Don't We Know When the First People Came to America? *American Antiquity* 54(3):471-490.
- Meltzer, D. J., and J. I. Mead  
1985 Dating Late Pleistocene Extinctions: Theoretical Issues, Analytical Bias, and Substantive Results. In *Environments and Extinctions: Man in Late Glacial North America*, edited by J. I. Mead and D. J. Meltzer, pp. 145-173. Center for the Study of Early Man, Orono, Maine.
- Merrell, J. H.  
1987 "This Western World": The Evolution of the Piedmont, 1525-1725. In *The Siouan Project: Seasons I and II*, edited by Roy S. Dickens, H. Trawick Ward, and R. P. Stephen Davis, Jr., pp. 19-28. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Michie, J. L.  
1968 The Brier Creek Lanceolate. *The Chesopiean* 4 (5-6): 76.  
1990 Bioturbation and Gravity as a Potential Site Formation Process: The Open Air Site, 38GE261, Georgetown County, South Carolina. *South Carolina Antiquities* 22:27-46.
- Mikell, G. A.  
1987 The Donnaha Site: Late Woodland Period Subsistence and Ecology. M.A. Thesis, Department of Anthropology, Wake Forest University, Winston-Salem, North Carolina.
- Milanich, J. T.  
1971 The Deptford Phase: An Archaeological Reconstruction. Ph.D. Dissertation, Department of Anthropology, University of Florida.
- Milanich, J. T., and C. H. Fairbanks  
1980 *Florida Archaeology*. Academic Press, New York.
- Moore, C. R.  
2002 The Early Archaic Debitage Assemblage. In *G. S. Lewis-East: Early and Late Archaic Occupations Along the Savannah River, Aiken County, South Carolina*, edited by K. E. Sassaman, I. R. Daniel, Jr., and C. R. Moore, pp. 73-108. Savannah River Archaeological Research papers 12. SCIAA, University of South Carolina, Columbia.
- Moore, C. R., and J. D. Irwin  
2003 *Quarries, Procurement, and Carolina Sandhills: A Multidisciplinary Lithic Sourcing Study*. Poster prepared for the Mid-Atlantic Archaeological Conference.

- Morrow, C. A., and R. W. Jefferies  
 1981 Trade or Embedded Procurement: A Test Case from Southern Illinois. Paper presented at the Conference on Prehistoric Chert Exploitation, Southern Illinois University at Carbondale, Carbondale, Illinois.
- Morse, D. F. and A. C. Goodyear, III  
 1973 The Significance of the Dalton Adz in Northeast Arkansas. *Plains Anthropologist* 18(62): 316-322.
- Nelson, L.  
 1968 Nail Chronology as an Aid to Dating Old Buildings. *History News* 23(11):495-6174.
- Newcomer, M. H.  
 1971 Some Quantitative Experiments in Handaxe Manufacture. *World Archaeology* 3(1): 85-93.
- North Carolina Department of Conservation and Development  
 1958 *Geologic Map of North Carolina*. Department of Conservation and Development, Raleigh.
- North Carolina Geological Survey  
 1985 *Geologic Map of North Carolina*. North Carolina Department of Natural Resources and Community Development.
- Noss, R.F.  
 1989 Longleaf Pine and Wiregrass: Keystone Components of an Endangered Ecosystem. *Natural Areas Journal* 9(4):211-213.
- Novick, A. Lee  
 1978 Prehistoric Lithic Material Sources and Types in South Carolina: A Preliminary Statement. *South Carolina Antiquities* 10:422-37.
- Miller, G.  
 1991 A Revised Set of CC Index Values for Classification and Scaling of English Ceramics from 1787 to 1880. *Historical Archaeology* 25: 1- 25
- Odum, E. P.  
 1971 *Fundamentals of Ecology, 3rd Edition*. W. B. Saunders Company, Philadelphia.
- Oliver, B. A.  
 1981 The Piedmont Tradition: Refinement of the Savannah River Stemmed Point Type. Unpublished M.A. thesis, Department of Anthropology, University of North Carolina, Chapel Hill.
- 1983 Refinement of the North Carolina Chronological Sequences. In *Piedmont Archaeology*, edited by J. M. Wittkofski and L. Browning. Archeological Society of Virginia, Special Publication No. 10, pp. 125-147.
- 1985 Tradition and Typology: basic Elements of the Carolina Projectile Point Sequence. In *Structure and Process in Southeastern Archaeology*, edited by R. S. Dickens and T. ward, pp. 195-211. University of Alabama Press, Tuscaloosa.
- Orser, C. E., Jr.  
 1988 *The Material Basis of the Postbellum Tenant Plantation: Historical Archaeology in the South Carolina Piedmont*. University of Georgia Press, Athens.

## References Cites

---

- Otto-Bleisner, B. L., G. W. Branstator, and D. D. Houghton  
1982 A Global Low-order Spectral General Circulation Model: Par II. Formulation and Seasonal Climatology. *Journal of the Atmospheric Sciences* 39:929-948.
- O'Steen, L. D.  
1992 Paleoindian and Early Archaic Settlement Along the Oconee Drainage. In *Paleoindian and Early Archaic Period Research in the Lower Southeast: A South Carolina Perspective*, edited by D. G. Anderson, K. E. Sassaman, and C. Judge. pp. 87-112.  
1994 *The Bear Creek Site (38FA204/205): Paleoindian and Early Archaic Occupation in the Lower Piedmont of South Carolina*. Southeastern Archaeological Services, Athens.
- O'Steen, L. D., R. J. Ledbetter, D. T. Elliott, and W. W. Barker  
1986 Paleo-Indian Sites of the Inner Piedmont of Georgia: Observations of Settlement in the Oconee Watershed. *Early Georgia* 13.
- Overstreet, W. C., and H. B. Bell  
1965 *The Crystalline Rocks of South Carolina*. Bulletin 1183. U. S. Geological Survey, Department of the Interior, Washington, D. C.
- Peabody, C.  
1910 The Exploration of Mounds in North Carolina. *American Anthropologist* 7(3):425-433.
- Petherick, G. L.  
1987 Architecture and Features at the Fredricks, Wall, and Mitchum Sites. In *The Siouan Project: Seasons I and II*, edited by Roy S. Dickens, H. Trawick Ward, and R. P. Stephen Davis, Jr., pp. 29-80. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Penny, J. T.  
1950 Distribution and Bibliography of the Mammals of South Carolina. *Journal of Mammology* 31(1): 81-89.
- Perkinson, P.  
1971 North Carolina Fluted Projectile Points: Survey Report Number One. *Southern Indian Studies*, Vol. XXII. The Archaeological Society of North Carolina, Chapel Hill.  
1973 North Carolina Fluted Projectile Points: Survey Report Number Two. *Southern Indian Studies*, Vol. XXV. The Archaeological Society of North Carolina, Chapel Hill.
- Phelps, D. S.  
1968 Thom's Creek Ceramics in the Central Savannah River Locality. *The Florida Anthropologist* 21(1):17-30.  
1983 Archaeology of the North Carolina Coast and Coastal Plain: Problems and Hypotheses. In *The Prehistory of North Carolina, an Archaeological Symposium*, edited by Mark A. Mathis and Jeffrey L. Crow, pp. 1-51. North Carolina Division of Archives and History, Department of Cultural Resources, Raleigh.

- 
- Pielou, E.C.  
1969 *An Introduction to Mathematical Ecology*. Wiley-Interscience, New York.  
1991 *After the Ice Age*. University of Chicago Press, Chicago.
- Platt, W. J., G. W. Evans, and S. L. Rathbun  
1988 The Population Dynamics of a Long-Lived Conifer (*Pinus Palustris*). *The American Naturalist* 131(4):491-497.
- Poplin, E. C., C. T. Espenshade, and D. C. Jones  
1993 *Archaeological Investigations at the Buck Hall Site (38CH644), Francis Marion National Forest, South Carolina*. Brockington and Associates, Inc., Atlanta. Francis Marion and Sumter National Forests, Cultural Resource Management Report 92-98.
- Quarterman, E., and C. Keever  
1962 Southern Mixed-Hardwood Forest: Climax in the Southeastern Coastal Plain. *Ecological Monographs* 32:167-185.
- Radisch, W.  
1999 Personal Communication to C. E. Cantley.
- Rafferty, J.E., B.L. Baker, and J.D. Elliott, Jr.  
1980 *Archaeological Excavations at the East Aberdeen Site (22Mo819)*. Tombigbee Multi-resource District, Alabama and Mississippi. Department of Anthropology, Mississippi State University. National Park Service, Southeastern Region.
- Ragland, P. C.  
1991 Mesozoic Igneous Rocks. In *The Geology of the Carolinas: Carolina Geological Society Fiftieth Anniversary Volume*, edited by J. W. Horton, Jr., and V. A. Zullo, pp. 171-190. University of Tennessee Press, Knoxville.
- Rathbun, T. A.  
1989 South Carolina Human Remains as an Archaeological Resource: An Update. In *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson*, edited by A. C. Goodyear, III and G. T. Hanson, pp. 1-18. Occasional Papers of the South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Anthropological Studies No. 9. Columbia.
- Redman, C. L.  
1973 Multistage Fieldwork and Analytical Techniques. *American Antiquity* 38(1): 61-79.  
1974 *Archaeological Sampling Strategies*. Addison-Wesley Module in Anthropology 55, Addison-Wesley Publishing Company, Inc., Philippines.
- Reid, J. J.  
1967 Pee Dee Pottery from the Mound at Town Creek. M. A. Thesis, Department of Anthropology, University of North Carolina, Chapel Hill. University Microfilms, Ann Arbor.
- Robbins, L. E., and R. L. Myers  
1989 Seasonal Effects of Prescribed Burning in Florida: A Review. Prepared for the Florida Game and Fresh Water Fish Commission Nongame Wildlife Program. The Nature Conservancy Fire Management and Research Program, Tallahassee, Florida.
-



## References Cites

---

- Robinson, K. W.  
1986 Archaeological Survey of Selected Portions of Cumberland County, North Carolina. Manuscript on file, North Carolina Division of Archives and History.
- Roenke, K. G.  
1978 *Flat Glass: Its Use as a Dating Tool for Nineteenth Century Archaeological Sites in the Pacific Northwest and Elsewhere*. Northwest Anthropological Research Notes, Memoir 4.
- Russo, M. J., B. A. Sorrie, B. V. Deerden, and T. E. Hippensteel  
1993 Rare and Endangered Plant Survey and Natural Area Inventory for Fort Bragg and Camp Mackall Military Reservations, North Carolina. Nature Conservancy, Carrboro, North Carolina.
- Rye, O. S.  
1976 Keeping Your Temper under Control: Materials and the Manufacture of Papuan Pottery. *Archaeology and Physical Anthropology in Oceania* 11(2): 106-137.
- Sandifer, P. A., J. V. Miglarese, D. R. Calder, J. J. Manzi, and L. A. Barclay  
1980 *Ecological Characterization of the Sea Islands Coastal Region of South Carolina and Georgia, Vol. II: Biological Features of the Characterization Area*. Coastal Ecosystems Project, U. S. Department of the Interior. Washington, D.C.
- Sassaman, K. E.  
1983 *Middle and Late Archaic Settlement in the South Carolina Piedmont*. M.A. Thesis, Department of Anthropology, University of South Carolina, Columbia.
- 1988 The Mid-Holocene Archeological Record of the Middle Savannah River Valley. In *The Archaeological Synthesis of the Savannah River Plant*. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia. In Press.
- 1991 Economic and Social Contexts of Early Ceramic Vessel Technology in the American Southwest. Ph.D. dissertation, Department of Anthropology, University of Massachusetts, Amherst.
- 1993 *Early Woodland Settlement in the Aiken Plateau: Archaeological Investigations at 38AK157, Savannah River Site, Aiken County, South Carolina*. Savannah River Archaeological Research Papers 3. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- 1996 Early Archaic Settlement in the South Carolina Coastal Plain. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 58-83. The University of Alabama Press, Tuscaloosa.
- Sassaman, K. E., and D. G. Anderson  
1990 Typology and Chronology. In *Native American Prehistory of the Middle Savannah River Valley: A Synthesis of Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina*, edited by K. E. Sassaman, M. J. Brooks, G. T. Hanson, and D. G. Anderson, pp. 143-216. Occasional Papers of the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, No. 1. Columbia.

- Sassaman, K. E., and D. G. Anderson, editors  
 1994 *Middle and Late Archaic Archaeological Records of South Carolina. A Synthesis for Research and Resource Management.* Savannah River Archaeological Research Papers 6. Savannah River Research Program. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- 1996 *Archaeology of the Mid-Holocene Southeast.* University Press of Florida, Gainesville.
- Sassaman, K. E., M. J. Brooks, G. T. Hanson, and D. G. Anderson  
 1990 *Native American Prehistory of the Middle Savannah River Valley: A Synthesis of Archaeological Investigations on the Savannah River Site, Aiken and Barnwell Counties, South Carolina.* Occasional Papers of the Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, No. 1. Columbia.
- Schiffer, M. B.  
 1976 *Behavioral Archaeology.* Academic Press, New York.
- Semenov, S. A.  
 1964 *Prehistoric Technology.* Adams and Dart, Bath, Somerset.
- Semken, H. A., Jr.  
 1974 Micromammal Distribution and Migration During the Holocene. In *American Quarternary Association, Third Biennial Meeting, Abstracts*, pp. 25. University of Wisconsin, Madison.
- 1983 Holocene Mammalian Biogeography and Climatic Change in the Eastern and Central United States. In *Late Quarternary Environments of the United States, Volume 2, The Holocene.* Edited by H. E. Wright, Jr., pp. 182-207. University of Minnesota Press, Minneapolis.
- Seramur, K. C.  
 2004 Draft: Geoarchaeology of Site 31HT435, Harnett County, North Carolina. Report submitted to New South Associates, Stone Mountain, Georgia.
- Seramur, K. C., and E. A. Cowan  
 2003 Site Formation Processes of Buried Cultural Horizons in the Sandhills of North Carolina: An Example from the Horses Grazing Site (31MR205). *North Carolina Archaeology* (52): 101-118.
- Shaler, N. S.  
 1891 *The Origin and Nature of Soils.* U. S. Geological Survey, Twelfth Annual Report. Washington.
- Shelford, V. E.  
 1963 *The Ecology of North America.* University of Illinois Press, Urbana.
- Shott, M. J.  
 1994 Size and Form in the Analysis of Flake Debris: Review and Recent Approaches. *Journal of Archaeological Method and Theory* 1: 69-110.
- Siegel, P. E.  
 1984 Functional Variability within an Assemblage of Endscrapers. *Lithic Technology* 13: 35-51.
- Simon, J. L.  
 1997 *Resampling: The New Statistics.* Resampling Stats, Arlington, Virginia.

## References Cites

---

- Smith, B. D.  
1986 The Archaeology of the Southeastern United States: From Dalton to de Soto, 10,500-500 B.P. In *Advances in World Archaeology*, edited by F. Wendorf and A. Close, pp. 1-91. Academic Press, New York.
- Smith, M. T.  
1987 *Archaeology of Aboriginal Culture Change in the Interior Southeast: Depopulation During the Early Historic Period*. University of Florida Press, The Florida State Museum, Gainesville.
- Sohl, N F., and J. P. Owens  
1991 Cretaceous Stratigraphy of the Carolina Coastal Plain. In *The Geology of the Carolinas*, edited by J. Wright Horton, Jr., and Victor A. Zullo, pp. 191-220. Univ. of Tennessee Press, Knoxville.
- South, S. A.  
1959 A Study of the Prehistory of the Roanoke Rapids Basin. Unpublished M.A. Thesis, Department of Anthropology, University of North Carolina, Chapel Hill.  
  
1966 Exploratory Excavation of the McFayden Mound, Brunswick County, N.C. *Southern Indians Studies* 18:59-61.  
  
1976 An Archaeological Survey of Southeastern North Carolina. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, *The Notebook* 8: 1-55.  
  
1977 *Method and Theory in Historical Archaeology*. Academic Press, New York.  
  
1979 Historic Site Content, Structure, and Function. *American Antiquity* 44(2):213-236.
- Spiess, A.E.  
1984 Arctic Garbage and New England Paleo-Indians: The Single Occupation Option. *Archaeology of Eastern North America* 13:280-285.
- Spivey, T.  
1979 *A Historical Guide to Wagon Hardware & Blacksmith Supplies*. Contributions of the Museum of the Great Plains No. 9. Lawton, Oklahoma.
- Spock, L. E.  
1962 *Guide to the Study of Rocks*. Harper & Row, Publishers. New York.
- Steen, C.  
2005 *Phase II Archaeological Investigations of Four Historic Sites (C5890020435-D5095020469), Fort Bragg, NC*. Final Draft Report prepared for the National Park Service, Southeast Archeological Center, Tallahassee, FL and the Public Works Center, Fort Bragg, NC. Palmetto Research Institute Publication in Archaeology TBSA.
- Steponaitis, V. P.  
1986 Prehistoric Archaeology in the Southeastern United States, 1970-1985. *Annual Review of Anthropology* 15:363-404.
- Stevenson, M. G.  
1991 Beyond the Formation of Hearth-Associated Artifact Assemblages. In *The Interpretation of Archaeological Spatial Patterning*, edited by Ellen M. Kroll and T. D. Price, pp. 269-300. Plenum Press, New York.

- 
- Stewart, R., and G. Cosentino  
1976 *Bottles: A Guide for the Beginning Collector*. Golden Press, New York.
- Stewart, T. D.  
1966 Skeletal Analysis of the MacLean Mound. *Southern Indian Studies* 18:67-88.
- Stoltman, J. B.  
1972 The Late Archaic in the Savannah River Region. In *Fiber Tempered Pottery in the Southeastern United States and Northern Columbia*, edited by Ripley Bullen and James Stoltman. Florida Anthropological Society, Publication No. 6.  
1974 *Groton Plantation: an Archaeological Study of a South Carolina Locality*. Harvard University, Monographs of the Peabody Museum No. 1. Cambridge.
- Sundelius, H. W.  
1970 The Carolina Slate Belt. In *Studies of Appalachian Geology*. Edited by G. W. Fisher, H. J. Pettijohn, J. C. Reed, and R. N. Weaver. Wiley-Interscience, New York.
- Swanton, J. R.  
1946 *The Indians of the Southeastern United States*. Smithsonian Institution, Bureau of American Ethnology, Bulletin No. 137. Washington, D. C.
- Thomas, D. H., and C. S. Larsen  
1979 *The Anthropology of St. Catherine's Island, 2. The Refuge-Deptford Mortuary Complex*. Anthropological Papers of the American Museum of Natural History No. 56 (1). New York.
- Tippett, J. L.  
1992 The Spatial Distribution of Lithic Materials: Implications for Early and Middle Archaic Hunter-Gatherer Mobility in South Carolina. Unpublished M. A. Thesis, University of Tennessee, Knoxville.
- Tippitt, V. A., and I. R. Daniel  
1987 Lithic Artifacts from the Fredericks, Wall, and Mitchum Sites. In *The Siouan Project: Seasons I and II*, edited by R. S. Dickens, H. T. Ward, and R. P. S. Davis, Jr, pp. 217-236. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Todd, L. C.  
1983 *The Horner Site: Taphonomy of an Early Holocene Bison Bonebed*. Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.
- Trinkley, M. B.  
1980a Investigation of the Woodland Period Along the South Carolina Coast. Unpublished Ph.D. dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.  
1980b A Typology of Thom's Creek Pottery for the South Carolina Coast. *South Carolina Antiquities* 12(1):1-35.  
1981 *Archaeological Testing of the Walnut Grove Shell Midden, Charleston County, South Carolina*. USDA Forest Service. Columbia.
-

## References Cites

---

- Trinkley, M.B., W. B. Barr, and D. Hacker  
1998 *Fort Bragg 5: An Archaeological Survey of the 942.63 ha Northern Training Area IV on Fort Bragg, Harnett County, North Carolina*. Chicora Research Contribution 240. Report submitted to the National Park Service, Southeast Archaeological Center.
- USDA (United States Department of Agriculture)  
1984 *Soil Survey of Cumberland and Hoke Counties North Carolina*. US Department of Agriculture Soil Conservation Service, North Carolina Agricultural Extension Service, Fayetteville, North Carolina.
- Van der Merwe, N.J., and J.C. Vogel  
1978 13C Content of Human Collagen as a Measure of Prehistoric Diet in Woodland North America. *Nature* 276:815-816.
- Voorhies, M. R.  
1974 Pleistocene Vertebrates with Boreal Affinities in the Georgia Piedmont. *Quaternary Research* 4(1):85-93.
- Waddell, E.  
1980 *Indians of the South Carolina Lowcountry, 1562-1751*. Reprint Company, Spartanburg, S.C.  
1971 A Ceramic Sequence for the Coastal Plain of South Carolina. *South Carolina Antiquities* 3(1): 45-61.
- Wagner, G. E.  
1982 Testing Flotation Recovery Rates. *American Antiquity* 47:127-132.
- Walthall, J. A.  
1980 *Prehistoric Indians of the Southeast: Archaeology of Alabama and the Middle South*. The University of Alabama Press.
- Watson, P. J.  
1976 In Pursuit of Prehistoric Subsistence: A Comparative Account of Some Contemporary Flotation Techniques. *Mid-Continental Journal of Archaeology* 1(1):77-100.
- Ward, H. T.  
1983 A Review of Archaeology in the North Carolina Piedmont: A Study of Change. In *The Prehistory of North Carolina: An Archaeological Symposium*. Mark A. Mathis and Jeffery J. Crow (eds.) North Carolina Division of Archives and History, Raleigh.  
1987 Mortuary Patterns at the Fredricks, Wall, and Mitchum Sites. In *The Siouan Project: Seasons I and II*, edited by Roy S. Dickens, H. Trawick Ward, and R. P. Stephen Davis, Jr., pp. 81-110. Research Laboratories of Anthropology, University of North Carolina, Monograph Series No. 1. Chapel Hill.
- Ward, H. T., and R. P. S. Davis, Jr., editors  
1993 *Indian Communities of the North Carolina Piedmont, A.D. 1000 to 1700*. Research Laboratories of Anthropology, University of North Carolina, Monograph No. 2. Chapel Hill.
- Watts, W. A.  
1969 A Pollen Diagram from Mud Lake, Marion County, North Central Florida. *Geological Society of America Bulletin* 80:631-642.



---

Watts, W. A. (cont.)

- 1970 The Full-Glacial Vegetation of Northeastern Georgia. *Ecology* 51: 17-33.
- 1971 Postglacial and Interglacial Vegetation History of Southern Georgia and Central Florida. *Ecology* 52:676-690.
- 1975a A Late Quarternary Record of Vegetation from Lake Annie, Southcentral Florida. *Geology* 3:344-346.
- 1975b Vegetation record for the Last 20,000 Years from a Small Marsh on Lookout Mountain, Northwestern Georgia. *Geological Society of America Bulletin* 86:287-291.
- 1979 Past Environments in South Carolina. In *An Intensive Archaeological survey of the South Carolina 151 Highway Widening Project*, John S. Cable and Charles E. Cantley, assemblers, pp. 268-270. University of South Carolina, Institute of Archaeology and Anthropology, Research Manuscript Number 150.
- 1980a The Late Quaternary Vegetation History of Southeastern United States. *Annual review of Ecology and Systematics* 11:387-409.
- 1980b Late-Quaternary Vegetation History at White Pond on the Inner Coastal Plain of South Carolina. *Quaternary Research* 13, 187-199.
- 1983 Vegetational History of the Eastern United States 25,000 to 10,000 Years Ago. In *The Late Pleistocene, v. 1 of Late Quaternary Environments of the United States*. Minneapolis, University of Minnesota Press, pp. 294-310.

Watts, W. A., and M. Stuiver

- 1980 Late Wisconsin Climate of Northern Florida and the Origin of Species Rich Deciduous Forests. *Science* 210:325-327.

Webb, T. III

- 1987 The Appearance and Disappearance of Major Vegetational Assemblages: Long-Term Vegetational Dynamics in Eastern North America. *Vegetatio* 69:177-187.
- 1988 Eastern North America. In *Vegetation History*, edited by B. Huntley and T. Webb, pp.383-414. Kluwer Academic Publishers.

Webb, T. III, and J. E. Kutzbach

- 1998 An Introduction to "Late Quaternary Climates: Data Syntheses and Model Experiments." *Quaternary Science Reviews* 17: 465-471.

Webb, S. D.

- 1981 *A Cultural Resources Survey of the Continental Shelf from Cape Hatteras to Key West. Volume I: Introduction and Physical Environment*. Science Applications, Inc. Report submitted to Bureau of Land Management.

Webb, S. D., J. T. Milanich, R. Alexon, and J. S. Dunbar

- 1984 *A Bison antiquus Kill Site, Wacissa River, Jefferson County, Florida*. *American Antiquity* 49:384-392.

## References Cites

---

- Webb, W. S., and D. L. DeJarnette  
1942 *An Archaeological Survey of Pickwick Basin in the Adjacent Portions of the States of Alabama, Mississippi and Tennessee*. Bureau of American Ethnology Bulletin 129. Washington.
- Wendland, W. M.  
1978 Holocene Man in North America: The Ecological Setting and Climatic Background. *Plains Anthropologist* 23 (82):273-287.
- Wetmore, R. Y.  
1978 Report on Excavations at the Buie Mound, Robeson County, North Carolina. Institute of Archeology and Anthropology, *Notebook* 10:30-71.  
1986 The Nipper Creek Site (38RD18): A Study in Archaic Stage Change. Unpublished M. A. Thesis, Department of Anthropology, University of South Carolina.
- Wharton, C.  
1978 *The Natural Environments of Georgia*. Geological and Water Resources Division and Resource Planning Section, Office of Planning Research, Georgia Department of Natural Resources, Atlanta.
- White, A. M., L. R. Binford, and M. L. Papworth  
1963 *Miscellaneous Studies in Typology and Classification*. Museum of Anthropology, University of Michigan, Anthropological Papers 19.
- White, J. W.  
1982 An Integration of Late Archaic Settlement Patterns for the South Carolina Piedmont. Unpublished M. A. Thesis, Department of Anthropology, University of Arkansas, Fayetteville.
- Whitehead, D. R.  
1973 Late-Wisconsin Vegetational Changes in Unglaciaded Eastern North America. *Quaternary Research* 3(4):621-631.
- Whitehead, D. R., and R. Q. Oaks, Jr.  
1979 Development History of the Dismal Swamp. In *The Great Dismal Swamp*, edited by P. W. Kirk, pp. 25-43. University Press of Virginia, Charlottesville.
- Widmer, Randolph J.  
1976 *Archeological Investigations at the Palm Tree Site, Berkeley County, South Carolina*. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Research Manuscript Series No. 103. Columbia.
- Williams, S. J., and J. B. Stoltman  
1965 An Outline of Southeastern United States Prehistory with Particular Emphasis on the Paleo-Indian Era. In *Quaternary History of the United States*, edited by H.E. Wright, Jr. and D. G. Frey, pp. 669-683. Princeton University Press, Princeton.
- Wobst, H. M.  
1974 Boundary Conditions for Paleolithic Social Systems: a Simulation Approach. *American Antiquity* 39: 147-178.-

- Wobst, H. M. (cont.)  
1977 Stylistic Behavior and Information Exchange. In *For the Director: Research Essays in Honor of James B. Griffin*, edited by C.E. Cleland. University of Michigan Museum of Anthropology, Anthropological Papers 61, pp. 317-342. Ann Arbor, University of Michigan Press.
- Wood, W. D., and R. J. Ledbetter  
1990 *Rush: An Early Woodland Period Site in Northwest Georgia*. Georgia Department of Transportation, Occasional Papers in Cultural Resource Management 4. Atlanta.
- Wright, H. E., Jr.  
1976 The Dynamic Nature of Holocene Vegetation Problem of Paleoclimatology, Biogeography, and Stratigraphic Nomenclature. *Quaternary Research* 6:581-596.  
1978 The Dynamic Nature of Holocene Vegetation: A Problem in Paleoclimatology, Biogeography and Stratigraphic Nomenclature. *Quaternary Research* 6:581-596.
- Yarnell, R. A., and M. J. Black  
1985 Temporal Trends Indicated by a Survey of Archaic and Woodland Plant Food Remains from Southeastern North America. *Southeastern Archaeology* 4(2): 93-106.
- Yellen, J.  
1977 *Archaeological Approaches to the Present: Models for Reconstructing the Past*. Academic Press, New York.